

DESCRIPTION

SULFAMOYL COMPOUNDS AND AGRICULTURAL AND HORTICULTURAL FUNGICIDES

TECHNICAL FIELD

The present invention relates to novel sulfamoyl compounds, and agricultural chemicals (insecticides, fungicides, herbicides, plant growth controlling agents and the like.), particularly agricultural and horticultural fungicides.

BACKGROUND ART

JP-A-3-170464, JP-A-6-32785, JP-A-7-2803 and JP-A-7-215971 describe that certain sulfamoyl compounds have bactericidal activities.

Even the compounds described in the above-described early publications are unsatisfactory in potency and residual effectiveness, thus developments of more useful agricultural and horticultural fungicide have been desired.

DISCLOSURE OF THE INVENTION

Under the circumstances, the present inventors have made extensive research with a view to developing excellent fungicide and, as a result, have found that novel sulfamoyl compounds have remarkable controlling activity as agricultural and horticultural fungicide, thus accomplishing the present invention.

That is, the present invention relates to [1] to [38].

[1] A sulfamoyl compound of the general formulae (1):

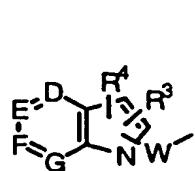


wherein

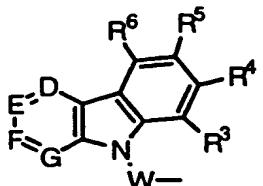
R^1 and R^2 are each independently C_{1-4} alkyl, or R^1 and R^2 together are C_{4-6} alkylene or C_{4-6} alkyleneoxy,

Y is H, halogen, C_{1-8} alkyl, C_{1-8} alkoxy, C_{1-8} alkylthio, C_{1-8} haloalkyl, C_{1-8} haloalkoxy or C_{1-8} haloalkylthio,

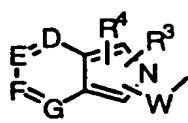
A is



A-1



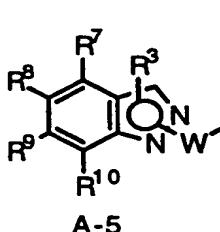
A-2



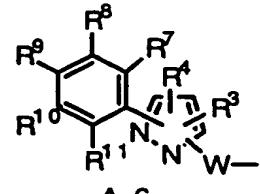
A-3



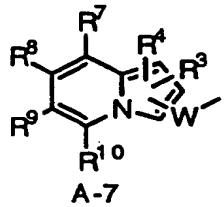
A-4



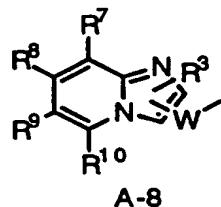
A-5



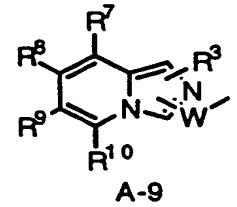
A-6



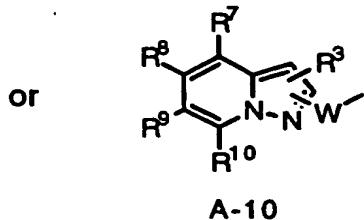
A-7



A-8

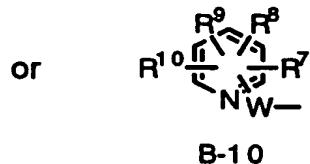
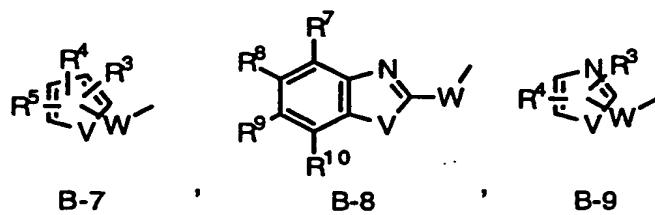
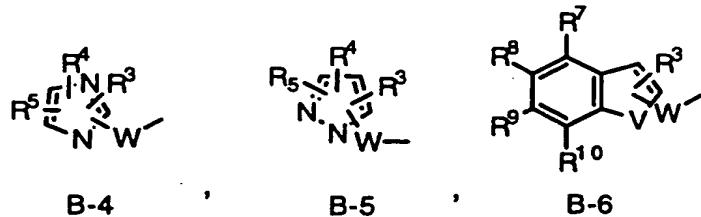
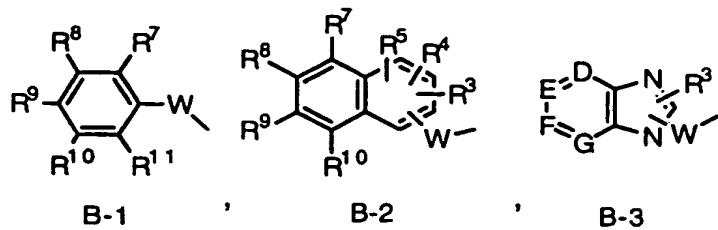


A-9



A-10

B is A-1 to A-10, or



W is a chemical bond or O,

v is 0 or s ,

D, E, F and G are each independently N, CR⁷, CR⁸, CR⁹ or CR¹⁰.

and

R^3 , R^4 , R^5 , R^6 , R^7 , R^8 , R^9 , R^{10} and R^{11} are each independently H, C_{1-8} alkyl, C_{3-8} cycloalkyl, C_{2-8} alkenyl, C_{5-8} cycloalkenyl, C_{2-8} alkynyl, C_{1-8} alkoxy, C_{3-8} cycloalkyloxy, C_{5-8} cycloalkenyloxy, C_{2-8} alkenyloxy, C_{2-8} alkynyloxy, C_{1-8} alkylthio, C_{3-8} cycloalkylthio, C_{5-8} cycloalkenylthio, C_{2-8} alkenylthio, C_{2-8} alkynylthio, C_{1-8} haloalkyl, C_{1-8} haloalkoxy, C_{1-8} haloalkylthio, C_{2-8} haloalkenyl, C_{2-8} haloalkenyloxy, C_{2-8} haloalkenylthio, C_{2-8} haloalkynyl, C_{2-8} haloalkynyloxy, C_{2-8} haloalkynylthio, phenyl which may be

substituted (the kinds of substituent include halogen, C₁₋₈ alkyl, C₁₋₈ haloalkyl, C₁₋₈ alkoxy, C₁₋₈ haloalkoxy, C₁₋₈ alkylthio, C₁₋₈ haloalkylthio, C₁₋₆ alkylsulfoxy, C₁₋₆ alkylsulfonyl, CN, NO₂ and C₁₋₆ alkoxy carbonyl, the number of the substituents is 1 to 5, and the substituents may be identical or different.), phenyl C₁₋₄ alkyl which may be substituted, benzylthio which may be substituted, benzyloxy which may be substituted, phenoxy C₁₋₄ alkyl which may be substituted, phenoxy which may be substituted, phenylthio C₁₋₄ alkyl which may be substituted, benzoyl which may be substituted, benzoyl C₁₋₄ alkyl which may be substituted, benzoyloxy which may be substituted, benzoyloxy C₁₋₄ alkyl which may be substituted, naphthyl which may be substituted, 5- or 6-membered heterocyclic ring which may be substituted, C₁₋₈ hydroxyalkyl, C₁₋₈ hydroxyhaloalkyl, C₁₋₆ alkoxy C₁₋₄ alkyl, C₁₋₆ haloalkoxy C₁₋₄ alkyl, C₁₋₆ haloalkylthio C₁₋₄ alkyl, C₁₋₁₀ dialkoxy C₁₋₄ alkyl, C₁₋₃ alkylenedioxy C₁₋₄ alkyl, C₁₋₆ alkylthio C₁₋₄ alkyl, C₁₋₁₀ dialkylthio C₁₋₄ alkyl, C₁₋₃ alkylenedithio C₁₋₄ alkyl, C₁₋₆ alkoxy carbonyl, C₁₋₆ haloalkoxy carbonyl, C₁₋₆ alkoxy oxazyl, CHO, CO₂H, C₁₋₆ alkoxy carbonyl C₁₋₄ alkyl, C₁₋₆ haloalkoxy carbonyl C₁₋₄ alkyl, NH₂, C₁₋₆ alkylamino, C₁₋₆ alkyl carbonyl amino, C₁₋₆ alkyl carbonyl amino C₁₋₄ alkyl, C₁₋₆ haloalkyl carbonyl amino, C₁₋₆ haloalkyl carbonyl amino C₁₋₄ alkyl, C₁₋₆ alkoxy carbonyl amino, C₁₋₆ alkoxy carbonyl amino C₁₋₄ alkyl, C₁₋₆ alkylsulfonyl amino, C₁₋₆ alkylsulfonyl amino C₁₋₄ alkyl, C₁₋₆ haloalkylsulfonyl amino, C₁₋₆ haloalkylsulfonyl amino C₁₋₄ alkyl, C₁₋₆ dialkyl amino, C₁₋₆ dialkyl amino C₁₋₄ alkyl, C₁₋₆ dialkylaminocarbonyl, C₁₋₆ dialkylaminocarbonyl C₁₋₄ alkyl, C₂₋₆ alkylene imino, C₂₋₆ alkylene imino C₁₋₄ alkyl, C₂₋₆ alkylene iminocarbonyl, C₂₋₆ alkylene iminocarbonyl C₁₋₄ alkyl, C₁₋₆ alkyl carbonyl, C₁₋₆ alkyl carbonyloxy, C₁₋₆ haloalkyl carbonyl, C₁₋₆ haloalkyl carbonyloxy, C₁₋₆ alkyl carbonyl C₁₋₄ alkyl, C₁₋₆ alkyl carbonyloxy C₁₋₄ alkyl, C₁₋₆ haloalkyl carbonyl C₁₋₄ alkyl, C₁₋₆ haloalkyl carbonyloxy C₁₋₄ alkyl, hydroxy imino C₁₋₄ alkyl, C₁₋₆ alkoxy imino C₁₋₄ alkyl, C₁₋₆ alkyl carbonyloxy imino C₁₋₄ alkyl, C₁₋₆ alkylsulfonyloxy imino C₁₋₄ alkyl, C₁₋₆ alkylsulfoxy, C₁₋₆

haloalkylsulfoxy, C₁₋₆ alkylsulfoxy C₁₋₄ alkyl, C₁₋₆
haloalkylsulfoxy C₁₋₄ alkyl, C₁₋₆ alkylsulfonyl, C₁₋₆
haloalkylsulfonyl, C₁₋₆ alkylsulfonyl C₁₋₄ alkyl, C₁₋₆
haloalkylsulfonyl C₁₋₄ alkyl, C₁₋₆ alkylsulfonyloxy, C₁₋₆
haloalkylsulfonyloxy, C₁₋₆ alkylsulfonyloxy C₁₋₄ alkyl, C₁₋₆
haloalkylsulfonyloxy C₁₋₄ alkyl, C₁₋₆ haloalkoxysulfonyl, C₁₋₆
haloalkoxysulfonyl C₁₋₄ alkyl, C₁₋₆ dialkylsulfamoyl, C₁₋₆
dialkylsulfamoyl C₁₋₄ alkyl, C₁₋₆ alkoxy sulfonyl, C₁₋₆
alkoxy sulfonyl C₁₋₄ alkyl, C₂₋₆ cyanoalkyl, CN, C₁₋₆ thiocarbamoyl,
C₁₋₆ nitroalkyl, NO₂ or halogen, or
two of R³, R⁴, R⁵, R⁶, R⁷, R⁸, R⁹, R¹⁰ and R¹¹ together are C₁₋₃
alkylenedioxy which may be substituted, or C₃₋₆ alkylene.

[2] A sulfamoyl compound described in [1] above, in which A is
A-1.

[3] A sulfamoyl compound described in [1] above, in which A is
A-2.

[4] A sulfamoyl compound described in [1] above, in which A is
A-3.

[5] A sulfamoyl compound described in [1] above, in which A is
A-4.

[6] A sulfamoyl compound described in [1] above, in which A is
A-5 or A-6.

[7] A sulfamoyl compound described in [1] above, in which A is
A-7 or A-8.

[8] A sulfamoyl compound described in [1] above, in which A is
A-9 or A-10.

[9] A sulfamoyl compound described in [1] above, in which B is
B-1.

[10] A sulfamoyl compound described in [1] above, in which B is
B-2.

[11] A sulfamoyl compound described in [1] above, in which B is
B-3 or B-4.

[12] A sulfamoyl compound described in [1] above, in which B is
B-5.

[13] A sulfamoyl compound described in [1] above, in which B is

B-6 or B-7.

[14] A sulfamoyl compound described in [1] above, in which B is B-8 or B-9.

[15] A sulfamoyl compound described in [1] above, in which B is B-10.

[16] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is C₁₋₈ alkylthio.

[17] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is C₁₋₈ alkyl.

[18] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is C₁₋₈ haloalkyl.

[19] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is halogen.

[20] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is H.

[21] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and R³ is CN.

[22] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-2, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and any of R³, R⁴, R⁵ and R⁶ is H.

[23] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-4, and at least one of R³, R⁴, R⁵ and R⁶ is phenyl which may be substituted.

[24] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, and B is B-1.

[25] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is C₁₋₈ alkyl, and R⁴ is halogen.

[26] A sulfamoyl compound described in [1] above, in which R¹

and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, and any of R³ and R⁴ is halogen.

[27] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is C₁₋₈ alkyl, and R⁴ is H or C₁₋₈ alkyl.

[28] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is C₁₋₈ haloalkyl, and R⁴ is H, halogen or C₁₋₈ alkyl.

[29] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is H or C₁₋₈ alkyl, and R⁴ is C₁₋₆ alkoxy carbonyl.

[30] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is H, and R⁴ is halogen.

[31] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, D, E, F and G are CR⁷, CR⁸, CR⁹ or CR¹⁰, R³ is CN, and R⁴ is H or C₁₋₈ alkyl.

[32] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, any of D, E, F and G is CH, R³ is C₁₋₈ alkyl, and R⁴ is halogen.

[33] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, any of D, E, F and G is CH, and any of R³ and R⁴ is halogen.

[34] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, any of D, E, F and G is CH, R³ is C₁₋₈ haloalkyl, and R⁴ is H or C₁₋₈ alkyl.

[35] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, any of D, E, F and G is CH, R³ is Me or Et, and R⁴ is Cl or Br.

[36] A sulfamoyl compound described in [1] above, in which R¹ and R² are Me, Y is H, W is a chemical bond, A is A-1, any of D, E, F and G is CH, R³ is Cl or Br, and R⁴ is Cl or Br.

[37] An agricultural chemical containing as the active ingredient at least one sulfamoyl compound described in [1] to [36] above.

[38] An agricultural chemical as described in [37] above, in which the agricultural chemical is an agricultural and horticultural fungicide.

In the compounds of the general formula (1), examples of C_{1-4} alkyl for R^1 and R^2 are methyl, ethyl, n- or i-propyl, n-, i- or s-butyl and the like.

Examples of C_{4-6} alkylene formed by R^1 and R^2 together are piperidine including the N to which R^1 and R^2 are bonded and the like.

Examples of C_{4-6} alkyleneoxy formed by R^1 and R^2 together are morpholine including the N to which R^1 and R^2 are bonded and the like.

The definitions of substituents Y, R^3 , R^4 , R^5 , R^6 , R^7 , R^8 , R^9 , R^{10} and R^{11} have following meanings.

Examples of C_{1-8} alkyl are methyl, ethyl, n- or i-propyl, n- or i-butyl, n-pentyl and the like.

Examples of C_{3-8} cycloalkyl are cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl and the like.

Examples of C_{2-8} alkenyl are allyl, vinyl and the like.

Examples of C_{5-8} cycloalkenyl are cyclopentenyl and the like.

Examples of C_{2-8} alkynyl are propargyl and the like.

Examples of C_{1-8} alkoxy are methoxy, ethoxy and the like.

Examples of C_{3-8} cycloalkyloxy are cyclopropyloxy and the like.

Examples of C_{3-8} cycloalkenyloxy are cyclopentenyl-3-oxy and the like.

Examples of C_{2-8} alkenyloxy are allyloxy and the like.

Examples of C_{2-8} alkynyloxy are propargyloxy and the like.

Examples of C_{1-8} alkylthio are methylthio, ethylthio, n- or i-propylthio and the like.

Examples of C_{3-8} cycloalkylthio are cyclopentylthio and the like.

Examples of C_{3-8} cycloalkenylthio are cyclopentenyl-3-thio and the like.

Examples of C_{2-8} alkenylthio are allylthio and the like.

Examples of C_{2-8} alkynylthio are propargylthio and the like.

Examples of C_{1-8} haloalkoxy are trifluoromethoxy and the like.

Examples of C_{1-8} haloalkylthio are trifluoromethylthio and the like.

Examples of C_{1-8} haloalkyl are chloromethyl, dichloromethyl, dichlorofluoromethyl, trifluoromethyl and the like.

Examples of C_{2-8} haloalkenyl are 3-chloroallyl and the like.

Examples of C_{2-8} haloalkenyloxy are 3-chloroallyloxy and the like.

Examples of C_{2-8} haloalkenylthio are 3-chloroallylthio and the like.

Examples of C_{2-8} haloalkynyl are iodopropargyl and the like.

Examples of C_{2-8} haloalkynyloxy are iodopropargyloxy and the like.

Examples of C_{2-8} haloalkynylthio are iodopropargylthio and the like.

Examples of C_{1-8} hydroxyalkyl are hydroxymethyl, 1-hydroxyethyl and the like.

Examples of C_{1-8} hydroxyhaloalkyl are 2,2,2-trifluoro-1-hydroxyethyl and the like.

Examples of C_{1-6} alkoxy C_{1-4} alkyl are methoxymethyl, methoxyethyl and the like.

Examples of C_{1-6} haloalkoxy C_{1-4} alkyl are trifluoroethoxymethyl and the like.

Examples of C_{1-6} alkylthio C_{1-4} alkyl are methylthiomethyl, ethylthiomethyl, methylthioethyl and the like.

Examples of C_{1-6} haloalkylthio C_{1-4} alkyl are trifluoroethylthiomethyl and the like.

Examples of C_{1-10} dialkoxy C_{1-4} alkyl are dimethoxymethyl, diethoxymethyl and the like.

Examples of C_{1-10} dialkylthio C_{1-4} alkyl are

dimethylthiomethyl, diethylthiomethyl and the like.

Examples of C_{1-3} alkylenedioxy C_{1-4} alkyl are ethylenedioxymethyl and the like.

Examples of C_{1-3} alkylenedithio C_{1-4} alkyl are ethylenedithiomethyl and the like.

Examples of phenoxy C_{1-4} alkyl which may be substituted are phenoxyethyl and the like.

Examples of phenoxy which may be substituted are phenoxy and the like.

Examples of phenylthio C_{1-4} alkyl which may be substituted are phenylthiomethyl and the like.

Examples of phenylthio which may be substituted are phenylthio and the like.

Examples of phenyl C_{1-4} alkyl which may be substituted are benzyl, phenethyl and the like.

Examples of benzylthio which may be substituted are benzylthio and the like.

Examples of benzyloxy which may be substituted are benzyloxy and the like.

Examples of phenyl which may be substituted are phenyl and the like.

Examples of benzoyl which may be substituted are benzoyl and the like.

Examples of benzoyl C_{1-4} alkyl which may be substituted are benzoylmethyl and the like.

Examples of benzyloxy which may be substituted are benzyloxy and the like.

Examples of benzyloxy C_{1-4} alkyl which may be substituted are benzyloxymethyl and the like.

Examples of naphthyl which may be substituted are naphthyl and the like.

Examples of 5- or 6-membered heterocyclic ring are pyridine, thiophene, furan, thiazole and the like.

Examples of C_{1-6} alkoxy carbonyl are methoxycarbonyl and the like.

Examples of C_{1-6} alkoxy carbonyl C_{1-4} alkyl are methoxycarbonylmethyl and the like.

Examples of C_{1-6} haloalkoxy carbonyl are fluoroethoxycarbonyl and the like.

Examples of C_{1-6} haloalkoxy carbonyl C_{1-4} alkyl are fluoroethoxycarbonylmethyl and the like.

Examples of C_{1-6} alkoxyoxalyl are methoxyoxalyl, ethoxyoxalyl and the like.

Examples of C_{1-6} dialkylamino are dimethylamino and the like.

Examples of C_{1-6} alkylamino are methylamino and the like.

Examples of C_{1-6} dialkylamino C_{1-4} alkyl are dimethylaminomethyl and the like.

Examples of C_{2-6} alkyleneimino are pyrrolidino, piperidino and the like.

Examples of C_{2-6} alkyleneiminocarbonyl are pyrrolidinocarbonyl, piperidinocarbonyl and the like.

Examples of C_{2-6} alkyleneimino C_{1-4} alkyl are pyrrolidinomethyl, piperidinomethyl and the like.

Examples of C_{2-6} alkyleneiminocarbonyl C_{1-4} alkyl are pyrrolidinocarbonylmethyl, piperidinocarbonylmethyl and the like.

Examples of C_{1-6} alkylcarbonylamino are acethylamino and the like.

Examples of C_{1-6} alkoxy carbonylamino are methoxycarbonylamino and the like.

Examples of C_{1-6} haloalkylcarbonylamino are trifluoroacethylamino and the like.

Examples of C_{1-6} alkylsulfonylamino are methanesulfonylamino and the like.

Examples of C_{1-6} haloalkylsulfonylamino are chloromethylsulfonylamino and the like.

Examples of C_{1-6} alkylcarbonylamino C_{1-4} alkyl are acetylaminomethyl and the like.

Examples of C_{1-6} alkoxy carbonylamino C_{1-4} alkyl are methoxycarbonylaminomethyl and the like.

Examples of C_{1-6} haloalkylcarbonylamino C_{1-4} alkyl are trifluoroacetylaminomethyl and the like.

Examples of C_{1-6} alkylsulfonylamino C_{1-4} alkyl are methanesulfonylaminomethyl and the like.

Examples of C_{1-6} haloalkylsulfonylamino C_{1-4} alkyl are chloromethylsulfonylaminomethyl and the like.

Examples of C_{1-6} dialkylaminocarbonyl are dimethylaminocarbonyl and the like.

Examples of C_{1-6} dialkylaminocarbonyl C_{1-4} alkyl are dimethylaminocarbonylmethyl and the like.

Examples of C_{1-6} alkylcarbonyl are acetyl and the like.

Examples of C_{1-6} haloalkylcarbonyl are trifluoroacetyl and the like.

Examples of C_{1-6} alkylcarbonyloxy are acetyloxy and the like.

Examples of C_{1-6} haloalkylcarbonyloxy are trifluoroacetyloxy and the like.

Examples of C_{1-6} alkylcarbonyl C_{1-4} alkyl are acetyl methyl and the like.

Examples of C_{1-6} haloalkylcarbonyl C_{1-4} alkyl are trifluoroacetyl methyl and the like.

Examples of C_{1-6} alkylcarbonyloxy C_{1-4} alkyl are acetyloxymethyl and the like.

Examples of C_{1-6} haloalkylcarbonyloxy C_{1-4} alkyl are trifluoroacetyloxymethyl and the like.

Examples of hydroxyimino C_{1-4} alkyl are hydroxyiminomethyl and the like.

Examples of alkoxyimino C_{1-4} alkyl are methoxyiminomethyl and the like.

Examples of C_{1-6} alkylcarbonyloxyimino C_{1-4} alkyl are acetyloxyiminomethyl and the like.

Examples of C_{1-6} alkylsulfonyloxyimino C_{1-4} alkyl are methanesulfonyloxyiminomethyl and the like.

Examples of C_{1-6} alkylsulfoxy are methylsulfoxy and the like.

Examples of C_{1-6} alkylsulfoxy C_{1-4} alkyl are methylsulfoxymethyl, ethylsulfoxymethyl, methylsulfoxyethyl

and the like.

Examples of C_{1-6} alkylsulfonyl are methanesulfonyl and the like.

Examples of C_{1-6} alkylsulfonyloxy are methanesulfonyloxy and the like.

Examples of C_{1-6} alkylsulfonyl C_{1-4} alkyl are methylsulfonylmethyl, ethylsulfonylmethyl, methylsulfonylethyl and the like.

Examples of C_{1-6} alkylsulfonyloxy C_{1-4} alkyl are methylsulfonyloxymethyl and the like.

Examples of C_{1-6} haloalkylsulfoxy are chloromethylsulfoxy and the like.

Examples of C_{1-6} haloalkylsulfoxy C_{1-4} alkyl are chloromethylsulfoxymethyl and the like.

Examples of C_{1-6} haloalkylsulfonyl are trifluoromethylsulfonyl and the like.

Examples of C_{1-6} haloalkylsulfonyloxy are trifluoromethylsulfonyloxy and the like.

Examples of C_{1-6} haloalkylsulfonyl C_{1-4} alkyl are trifluoromethylsulfonylmethyl and the like.

Examples of C_{1-6} haloalkylsulfonyloxy C_{1-4} alkyl are trifluoromethylsulfonyloxymethyl and the like.

Examples of C_{1-6} dialkylsulfamoyl are dimethylsulfamoyl and the like.

Examples of C_{1-6} dialkylsulfamoyl C_{1-4} alkyl are dimethylsulfamoylmethyl and the like.

Examples of C_{1-6} alkoxy sulfonyl are methoxysulfonyl and the like.

Examples of C_{1-6} alkoxy sulfonyl C_{1-4} alkyl are methoxysulfonylmethyl and the like.

Examples of C_{1-6} haloalkoxy sulfonyl are fluoroethoxysulfonyl and the like.

Examples of C_{1-6} haloalkoxy sulfonyl C_{1-4} alkyl are fluoroethoxysulfonylmethyl and the like.

Examples of C_{1-6} nitroalkyl are nitromethyl and the like.

Examples of C₂₋₆ cyanoalkyl are cyanomethyl and the like.

Examples of C₁₋₆ thiocarbamoyl are CSNH₂, and the like.

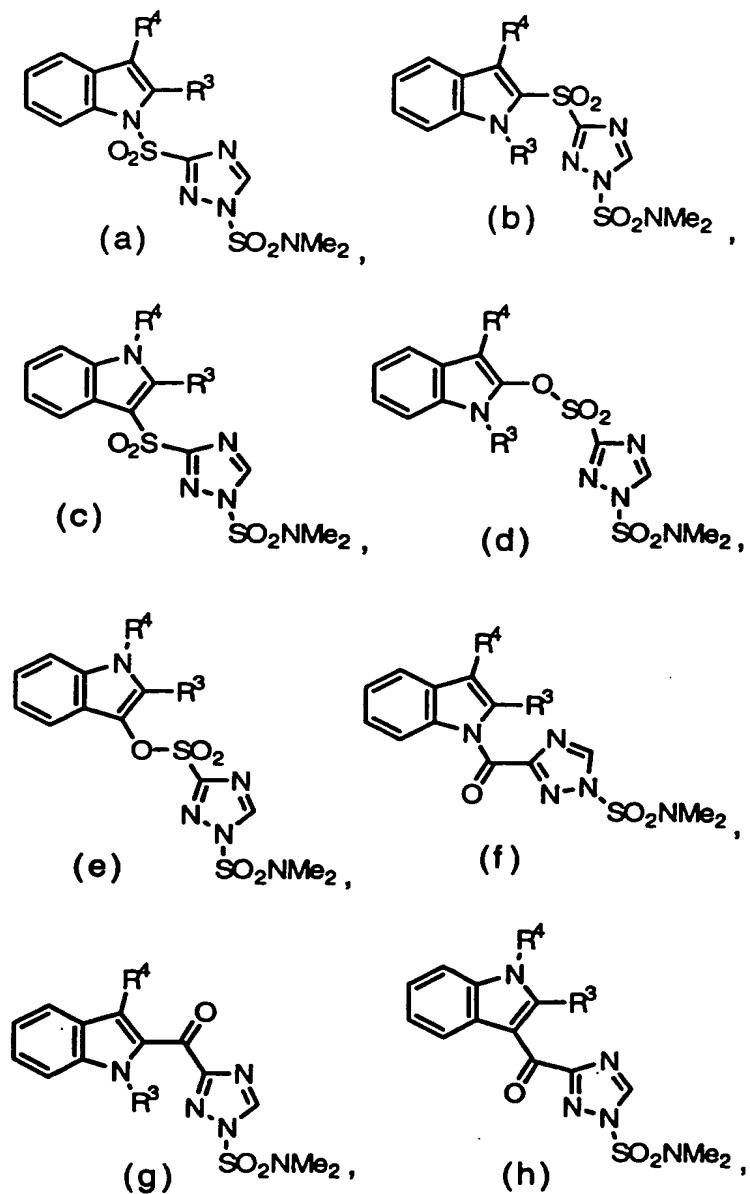
Examples of halogen are F, Cl, Br and I.

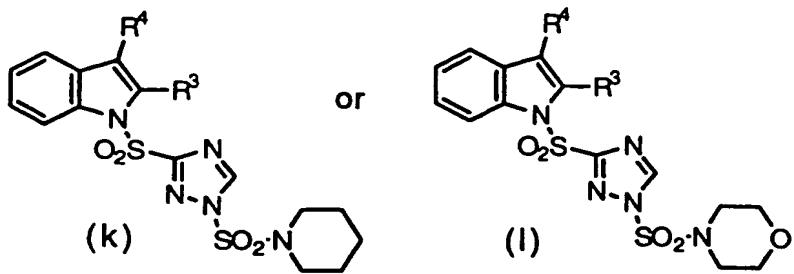
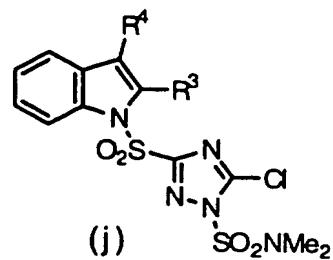
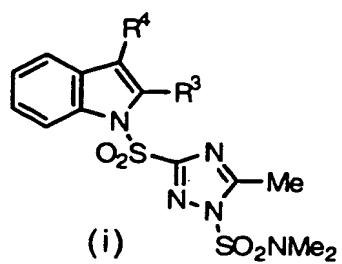
Examples of C₁₋₃ alkylenedioxy which may be substituted with halogen are difluoromethylenedioxy, tetrafluoroethylenedioxy and the like.

Next, the compounds of the invention of the formula (1) are shown in Tables 1 to 11. However, the present invention should not be construed as being limited thereto.

In the Tables, Me denotes methyl, Et denotes ethyl, Pr denotes propyl, Bu denotes butyl, n- denotes normal, i- denotes iso, s- denotes secondary, t- denotes tertiary, Ph denotes phenyl, Bn denotes benzyl, and Ac denotes acetyl.

Table 1





Compound No.	R ³	R ⁴
1-1	H	H
1-2	Me	H
1-3	Et	H
1-4	n-Pr	H
1-5	i-Pr	H
1-6	n-Bu	H
1-7	Ph	H
1-8	Bn	H
1-9	F	H
1-10	Cl	H
1-11	Br	H
1-12	I	H
1-13	SMe	H
1-14	SEt	H
1-15	CH ₂ OMe	H
1-16	CClF ₂	H
1-17	CHF ₂	H
1-18	CHFCl	H
1-19	CH ₂ Cl	H
1-20	CF ₃	H
1-21	CN	H
1-22	CHO	H
1-23	C ₂ F ₅	H
1-24	CH=NOMe	H
1-25	CO ₂ Me	H
1-26	CO ₂ Et	H

Table 1 (continue)

Compound No.	R ³	R ⁴
1-27	CONMe ₂	H
1-28	COMe	H
1-29	COPh	H
1-30	CH ₂ CO ₂ Me	H
1-31	NO ₂	H
1-32	H	Cl
1-33	Me	Cl
1-34	Et	Cl
1-35	n-Pr	Cl
1-36	i-Pr	Cl
1-37	n-Bu	Cl
1-38	Ph	Cl
1-39	Bn	Cl
1-40	F	Cl
1-41	Cl	Cl
1-42	Br	Cl
1-43	I	Cl
1-44	SMe	Cl
1-45	SEt	Cl
1-46	CH ₂ OMe	Cl
1-47	CHF ₂	Cl
1-48	CHFCl	Cl
1-49	CH ₂ Cl	Cl
1-50	CF ₃	Cl
1-51	CN	Cl
1-52	CHO	Cl
1-53	C ₂ F ₅	Cl
1-54	CH=NOMe	Cl
1-55	CO ₂ Me	Cl
1-56	CO ₂ Et	Cl
1-57	CONMe ₂	Cl
1-58	COMe	Cl
1-59	CClF ₂	Cl
1-60	CH ₂ CO ₂ Me	Cl
1-61	NO ₂	Cl
1-62	H	Br
1-63	Me	Br
1-64	Et	Br
1-65	n-Pr	Br
1-66	i-Pr	Br
1-67	n-Bu	Br
1-68	Ph	Br
1-69	Bn	Br
1-70	F	Br
1-71	Cl	Br
1-72	Br	Br

Table 1 (continue)

Compound No.	R ³	R ⁴
1-73	I	Br
1-74	SMe	Br
1-75	SET	Br
1-76	CH ₂ OMe	Br
1-77	CHF ₂	Br
1-78	CHFC1	Br
1-79	CH ₂ Cl	Br
1-80	CF ₃	Br
1-81	CN	Br
1-82	CHO	Br
1-83	C ₂ F ₅	Br
1-84	CH=NOMe	Br
1-85	CO ₂ Me	Br
1-86	CO ₂ Et	Br
1-87	CONMe ₂	Br
1-88	COMe	Br
1-89	CClF ₂	Br
1-90	CH ₂ CO ₂ Me	Br
1-91	NO ₂	Br
1-92	H	I
1-93	Me	I
1-94	Et	I
1-95	n-Pr	I
1-96	n-Bu	I
1-97	Ph	I
1-98	F	I
1-99	Cl	I
1-100	Br	I
1-101	I	I
1-102	SMe	I
1-103	CF ₃	I
1-104	CN	I
1-105	H	F
1-106	Me	F
1-107	Et	F
1-108	n-Pr	F
1-109	n-Bu	F
1-110	Ph	F
1-111	F	F
1-112	Cl	F
1-113	Br	F
1-114	CO ₂ Et	F
1-115	SMe	F
1-116	CF ₃	F
1-117	CN	F
1-118	H	Me

Table 1 (continue)

Compound No.	R ³	R ⁴
1-119	Me	Me
1-120	Et	Me
1-121	n-Pr	Me
1-122	CF ₂ Cl	Me
1-123	CHF ₂	Me
1-124	F	Me
1-125	Cl	Me
1-126	Br	Me
1-127	I	Me
1-128	SMe	Me
1-129	CF ₃	Me
1-130	CN	Me
1-131	CHO	Me
1-132	CH=NOH	Me
1-133	CH=NOMe	Me
1-134	CH=NOAc	Me
1-135	H	Et
1-136	Me	Et
1-137	Et	Et
1-138	n-Pr	Et
1-139	F	Et
1-140	Cl	Et
1-141	Br	Et
1-142	CHF ₂	Et
1-143	CClF ₂	Et
1-144	CF ₃	Et
1-145	CN	Et
1-146	CHO	Et
1-147	- (CH ₂) ₃ -	
1-148	- (CH ₂) ₄ -	
1-149	- (CH ₂) ₅ -	
1-150	- (CH ₂) ₆ -	
1-151	H	Ph
1-152	Me	Ph
1-153	Et	Ph
1-154	n-Pr	Ph
1-155	F	Ph
1-156	Cl	Ph
1-157	Br	Ph
1-158	I	Ph
1-159	SMe	Ph
1-160	CF ₃	Ph
1-161	CN	Ph
1-162	CHO	Ph
1-163	H	Bn
1-164	Me	Bn

Table 1 (continue)

Compound No.	R ³	R ⁴
1-165	Et	Bn
1-166	n-Pr	Bn
1-167	F	Bn
1-168	Cl	Bn
1-169	Br	Bn
1-170	I	Bn
1-171	SMe	Bn
1-172	CF ₃	Bn
1-173	CN	Bn
1-174	H	CF ₃
1-175	Me	CF ₃
1-176	Et	CF ₃
1-177	n-Pr	CF ₃
1-178	n-Bu	CF ₃
1-179	Ph	CF ₃
1-180	F	CF ₃
1-181	Cl	CF ₃
1-182	Br	CF ₃
1-183	I	CF ₃
1-184	SMe	CF ₃
1-185	CF ₃	CF ₃
1-186	CN	CF ₃
1-187	H	CHO
1-188	Me	CHO
1-189	Et	CHO
1-190	n-Pr	CHO
1-191	n-Bu	CHO
1-192	F	CHO
1-193	Cl	CHO
1-194	Br	CHO
1-195	I	CHO
1-196	SMe	CHO
1-197	CF ₃	CHO
1-198	CN	CHO
1-199	H	CH=NOH
1-200	Me	CH=NOH
1-201	Et	CH=NOH
1-202	n-Pr	CH=NOH
1-203	F	CH=NOH
1-204	Cl	CH=NOH
1-205	Br	CH=NOH
1-206	I	CH=NOH
1-207	SMe	CH=NOH
1-208	CF ₃	CH=NOH
1-209	CN	CH=NOH
1-210	H	CH=NOMe

Table 1 (continue)

Compound No.	R ³	R ⁴
1-211	Me	CH=NOMe
1-212	Et	CH=NOMe
1-213	n-Pr	CH=NOMe
1-214	F	CH=NOMe
1-215	Cl	CH=NOMe
1-216	Br	CH=NOMe
1-217	I	CH=NOMe
1-218	SMe	CH=NOMe
1-219	CF ₃	CH=NOMe
1-220	CN	CH=NOMe
1-221	H	CH=NOAc
1-222	Me	CH=NOAc
1-223	Et	CH=NOAc
1-224	n-Pr	CH=NOAc
1-225	F	CH=NOAc
1-226	Cl	CH=NOAc
1-227	Br	CH=NOAc
1-228	I	CH=NOAc
1-229	SMe	CH=NOAc
1-230	CF ₃	CH=NOAc
1-231	CN	CH=NOAc
1-232	H	COMe
1-233	Me	COMe
1-234	Et	COMe
1-235	n-Pr	COMe
1-236	n-Bu	COMe
1-237	F	COMe
1-238	Cl	COMe
1-239	Br	COMe
1-240	I	COMe
1-241	SMe	COMe
1-242	CF ₃	COMe
1-243	CN	COMe
1-244	H	COEt
1-245	Me	COEt
1-246	Et	COEt
1-247	n-Pr	COEt
1-248	n-Bu	COEt
1-249	Ph	COEt
1-250	F	COEt
1-251	Cl	COEt
1-252	Br	COEt
1-253	I	COEt
1-254	SMe	COEt
1-255	CF ₃	COEt
1-256	CN	COEt

Table 1 (continue)

Compound No.	R ³	R ⁴
1-257	H	COPh
1-258	Me	COPh
1-259	Et	COPh
1-260	n-Pr	COPh
1-261	F	COPh
1-262	Cl	COPh
1-263	Br	COPh
1-264	I	COPh
1-265	H	COCF ₃
1-266	Me	COCF ₃
1-267	Et	COCF ₃
1-268	n-Pr	COCF ₃
1-269	F	COCF ₃
1-270	Cl	COCF ₃
1-271	Br	COCF ₃
1-272	I	COCF ₃
1-273	SMe	COCF ₃
1-274	CF ₃	COCF ₃
1-275	CN	COCF ₃
1-276	H	CO ₂ Me
1-277	Me	CO ₂ Me
1-278	Et	CO ₂ Me
1-279	n-Pr	CO ₂ Me
1-280	n-Bu	CO ₂ Me
1-281	Ph	CO ₂ Me
1-282	F	CO ₂ Me
1-283	Cl	CO ₂ Me
1-284	Br	CO ₂ Me
1-285	I	CO ₂ Me
1-286	SMe	CO ₂ Me
1-287	CF ₃	CO ₂ Me
1-288	CN	CO ₂ Me
1-289	H	CO ₂ Et
1-290	Me	CO ₂ Et
1-291	Et	CO ₂ Et
1-292	F	CO ₂ Et
1-293	Cl	CO ₂ Et
1-294	Br	CO ₂ Et
1-295	SMe	CO ₂ Et
1-296	CF ₃	CO ₂ Et
1-297	CN	CO ₂ Et
1-298	H	CO ₂ n-Pr
1-299	Me	CO ₂ n-Pr
1-300	Et	CO ₂ n-Pr
1-301	F	CO ₂ n-Pr
1-302	Cl	CO ₂ n-Pr

Table 1 (continue)

Compound No.	R ³	R ⁴
1-303	Br	CO ₂ n-Pr
1-304	SMe	CO ₂ n-Pr
1-305	CF ₃	CO ₂ n-Pr
1-306	CN	CO ₂ n-Pr
1-307	H	CO ₂ I-Pr
1-309	Et	CO ₂ I-Pr
1-310	F	CO ₂ I-Pr
1-311	Cl	CO ₂ I-Pr
1-312	Br	CO ₂ I-Pr
1-313	SMe	CO ₂ I-Pr
1-314	CF ₃	CO ₂ I-Pr
1-315	CN	CO ₂ I-Pr
1-316	H	CO ₂ n-Bu
1-317	Me	CO ₂ n-Bu
1-318	Et	CO ₂ n-Bu
1-319	F	CO ₂ n-Bu
1-320	Cl	CO ₂ n-Bu
1-321	Br	CO ₂ n-Bu
1-322	SMe	CO ₂ n-Bu
1-323	CF ₃	CO ₂ n-Bu
1-324	CN	CO ₂ n-Bu
1-325	H	CO ₂ I-Bu
1-326	Me	CO ₂ I-Bu
1-327	Et	CO ₂ I-Bu
1-328	F	CO ₂ I-Bu
1-329	Cl	CO ₂ I-Bu
1-330	Br	CO ₂ I-Bu
1-331	SMe	CO ₂ I-Bu
1-332	CF ₃	CO ₂ I-Bu
1-333	CN	CO ₂ I-Bu
1-334	H	CO ₂ s-Bu
1-335	Me	CO ₂ s-Bu
1-336	Et	CO ₂ s-Bu
1-337	F	CO ₂ s-Bu
1-338	Cl	CO ₂ s-Bu
1-339	Br	CO ₂ s-Bu
1-340	SMe	CO ₂ s-Bu
1-341	CF ₃	CO ₂ s-Bu
1-342	CN	CO ₂ s-Bu
1-343	H	CO ₂ t-Bu
1-344	Me	CO ₂ t-Bu
1-345	Et	CO ₂ t-Bu
1-346	F	CO ₂ t-Bu
1-347	Cl	CO ₂ t-Bu
1-348	Br	CO ₂ t-Bu
1-349	SMe	CO ₂ t-Bu

Table 1 (continue)

Compound No.	R ³	R ⁴
1-396	Me	SO ₂ Me
1-397	Et	SO ₂ Me
1-398	Cl	SO ₂ Me
1-399	Br	SO ₂ Me
1-400	CF ₃	SO ₂ Me
1-401	CN	SO ₂ Me
1-402	H	SPh
1-403	Me	SPh
1-404	Et	SPh
1-405	n-Pr	SPh
1-406	F	SPh
1-407	Cl	SPh
1-408	Br	SPh
1-409	I	SPh
1-410	SMe	SPh
1-411	CF ₃	SPh
1-412	CN	SPh
1-413	H	SOPh
1-414	Me	SOPh
1-415	Et	SOPh
1-416	Cl	SOPh
1-417	Br	SOPh
1-418	CF ₃	SOPh
1-419	CN	SOPh
1-420	H	SO ₂ Ph
1-421	Me	SO ₂ Ph
1-422	Et	SO ₂ Ph
1-423	Cl	SO ₂ Ph
1-424	Br	SO ₂ Ph
1-425	CF ₃	SO ₂ Ph
1-426	CN	SO ₂ Ph
1-427	H	NO ₂
1-428	Me	NO ₂
1-429	Et	NO ₂
1-430	Cl	NO ₂
1-431	Br	NO ₂
1-432	SMe	NO ₂
1-433	CF ₃	NO ₂
1-434	CN	NO ₂
1-435	H	CN
1-436	Me	CN
1-437	Et	CN
1-438	n-Pr	CN
1-439	F	CN
1-440	Cl	CN
1-441	Br	CN

Table 1 (continue)

Compound No.	R ³	R ⁴
1-442	SMe	CN
1-443	CF ₃	CN
1-444	CN	CN
1-445	H	CH ₂ CN
1-446	Me	CH ₂ CN
1-447	Et	CH ₂ CN
1-448	n-Pr	CH ₂ CN
1-449	Cl	CH ₂ CN
1-450	Br	CH ₂ CN
1-451	SMe	CH ₂ CN
1-452	CF ₃	CH ₂ CN
1-453	CN	CH ₂ CN
1-454	H	OMe
1-455	Me	OMe
1-456	Et	OMe
1-457	Cl	OMe
1-458	Br	OMe
1-459	SMe	OMe
1-460	CF ₃	OMe
1-461	CN	OMe
1-462	H	CH ₂ NMe ₂
1-463	Me	CH ₂ NMe ₂
1-464	Et	CH ₂ NMe ₂
1-465	Cl	CH ₂ NMe ₂
1-466	Br	CH ₂ NMe ₂
1-467	SMe	CH ₂ NMe ₂
1-468	CF ₃	CH ₂ NMe ₂
1-469	CN	CH ₂ NMe ₂
1-470	H	OCOMe
1-471	Me	OCOMe
1-472	Et	OCOMe
1-473	Cl	OCOMe
1-474	Br	OCOMe
1-475	SMe	OCOMe
1-476	CF ₃	OCOMe
1-477	CN	OCOMe
1-478	H	CH(OMe) ₂
1-479	Me	CH(OMe) ₂
1-480	Et	CH(OMe) ₂
1-481	n-Pr	CH(OMe) ₂
1-482	Cl	CH(OMe) ₂
1-483	Br	CH(OMe) ₂
1-484	SMe	CH(OMe) ₂
1-485	CF ₃	CH(OMe) ₂
1-486	CN	CH(OMe) ₂
1-487	H	CH(SMe) ₂

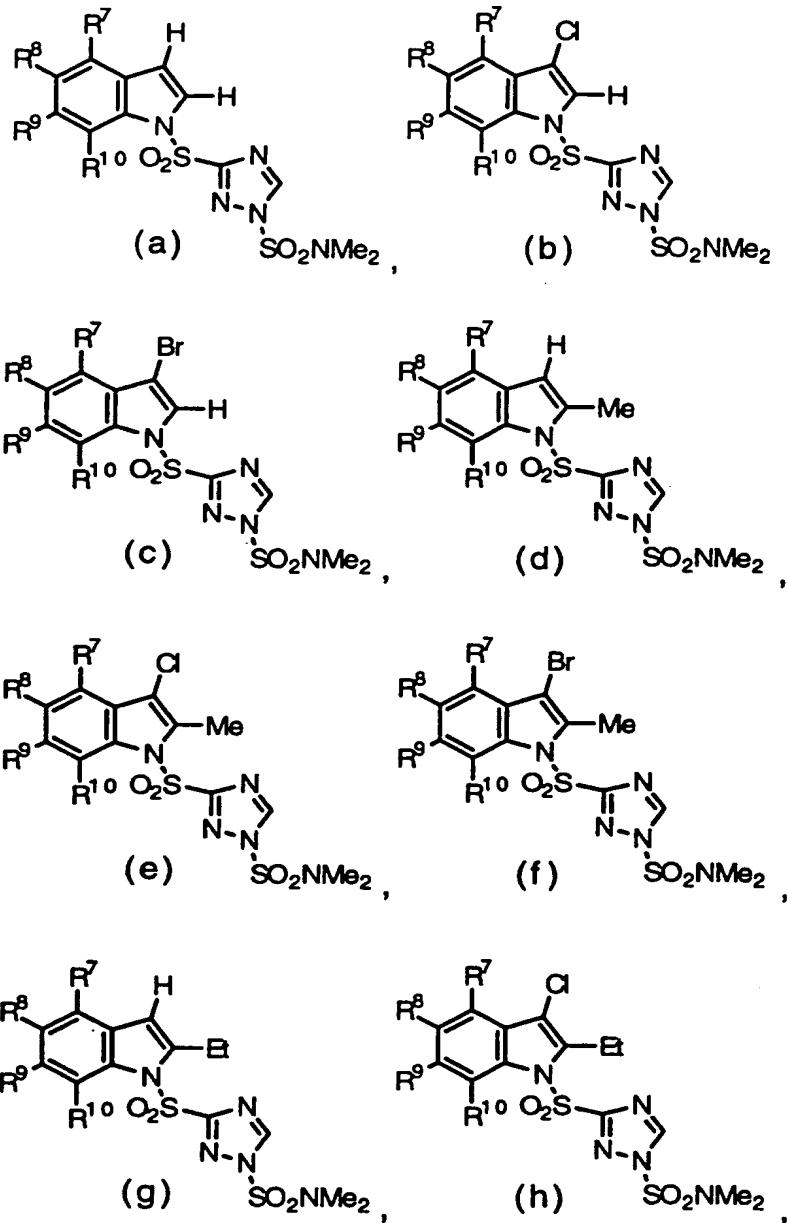
Table 1 (continue)

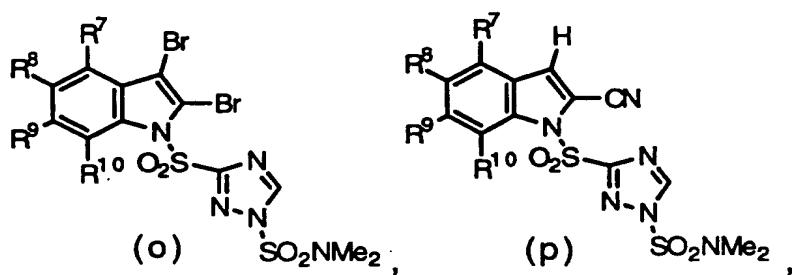
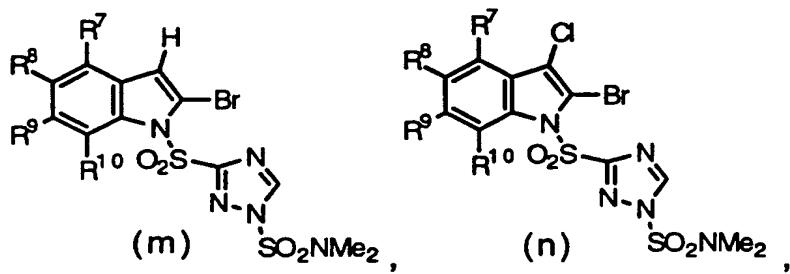
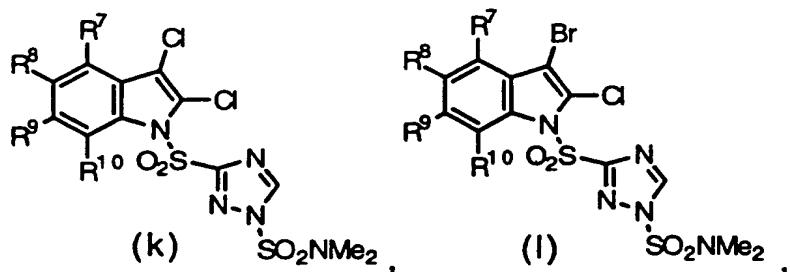
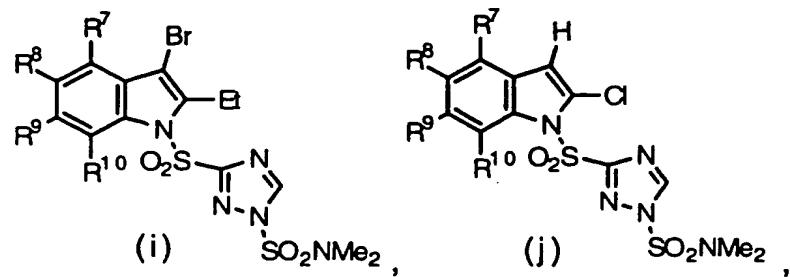
Compound No.	R ³	R ⁴
1-488	Me	CH(SMe) ₂
1-489	Et	CH(SMe) ₂
1-490	n-Pr	CH(SMe) ₂
1-491	Cl	CH(SMe) ₂
1-492	Br	CH(SMe) ₂
1-493	SMe	CH(SMe) ₂
1-494	CF ₃	CH(SMe) ₂
1-495	CN	CH(SMe) ₂
1-496	H	CH ₂ Cl
1-497	Me	CH ₂ Cl
1-498	Et	CH ₂ Cl
1-499	n-Pr	CH ₂ Cl
1-500	F	CH ₂ Cl
1-501	Cl	CH ₂ Cl
1-502	Br	CH ₂ Cl
1-503	I	CH ₂ Cl
1-504	SMe	CH ₂ Cl
1-505	CF ₃	CH ₂ Cl
1-506	CN	CH ₂ Cl
1-507	H	CH ₂ OH
1-508	Me	CH ₂ OH
1-509	Et	CH ₂ OH
1-510	n-Pr	CH ₂ OH
1-511	F	CH ₂ OH
1-512	Cl	CH ₂ OH
1-513	Br	CH ₂ OH
1-514	SMe	CH ₂ OH
1-515	CF ₃	CH ₂ OH
1-516	CN	CH ₂ OH
1-517	H	CH(OH)Me
1-518	Me	CH(OH)Me
1-519	Et	CH(OH)Me
1-520	n-Pr	CH(OH)Me
1-521	F	CH(OH)Me
1-522	Cl	CH(OH)Me
1-523	Br	CH(OH)Me
1-524	SMe	CH(OH)Me
1-525	CF ₃	CH(OH)Me
1-526	CN	CH(OH)Me
1-527	H	CH(OH)Et
1-528	Me	CH(OH)Et
1-529	Et	CH(OH)Et
1-530	n-Pr	CH(OH)Et
1-531	F	CH(OH)Et
1-532	Cl	CH(OH)Et
1-533	Br	CH(OH)Et

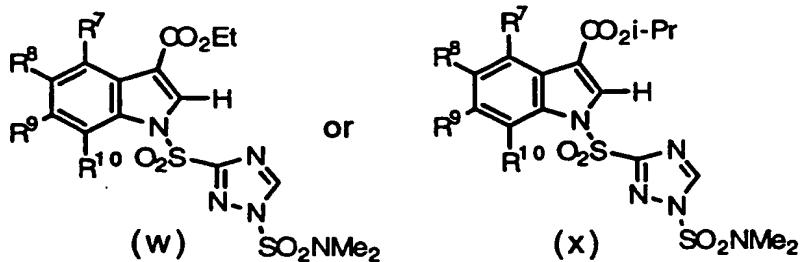
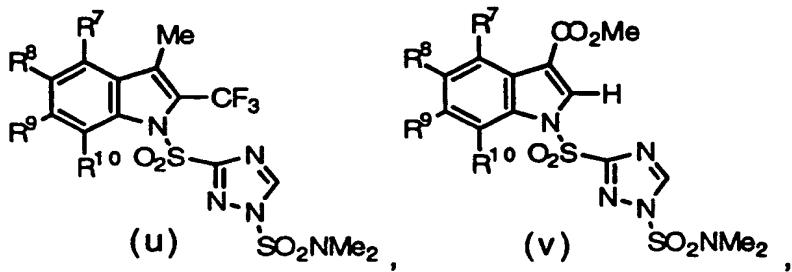
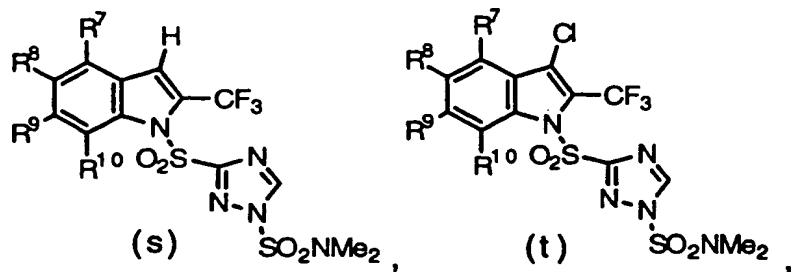
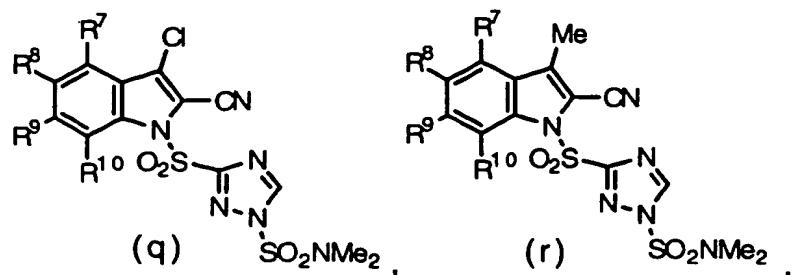
Table 1(continue)

Compound No.	R ³	R ⁴
1-534	SM	CH(OH)Et
1-535	CF ₃	CH(OH)Et
1-536	CN	CH(OH)Et
1-537	H	CH(OH)CF ₃
1-538	Me	CH(OH)CF ₃
1-539	Et	CH(OH)CF ₃
1-540	n-Pr	CH(OH)CF ₃
1-541	F	CH(OH)CF ₃
1-542	Cl	CH(OH)CF ₃
1-543	Br	CH(OH)CF ₃
1-544	SMe	CH(OH)CF ₃
1-545	CF ₃	CH(OH)CF ₃
1-546	CN	CH(OH)CF ₃
1-547	H	CH ₂ OMe
1-548	Me	CH ₂ OMe
1-549	Et	CH ₂ OMe
1-550	n-Pr	CH ₂ OMe
1-551	F	CH ₂ OMe
1-552	Cl	CH ₂ OMe
1-553	Br	CH ₂ OMe
1-554	SMe	CH ₂ OMe
1-555	CF ₃	CH ₂ OMe
1-556	CN	CH ₂ OMe
1-557	H	CONMe ₂
1-558	Me	CONMe ₂
1-559	Et	CONMe ₂
1-560	n-Pr	CONMe ₂
1-561	F	CONMe ₂
1-562	Cl	CONMe ₂
1-563	Br	CONMe ₂
1-564	SMe	CONMe ₂
1-565	CF ₃	CONMe ₂
1-566	CN	CONMe ₂
1-567	H	CO(4-CF ₃ Ph)
1-568	Me	CO(4-CF ₃ Ph)
1-569	Et	CO(4-CF ₃ Ph)
1-570	Cl	CO(4-CF ₃ Ph)
1-571	Br	CO(4-CF ₃ Ph)

Table 2





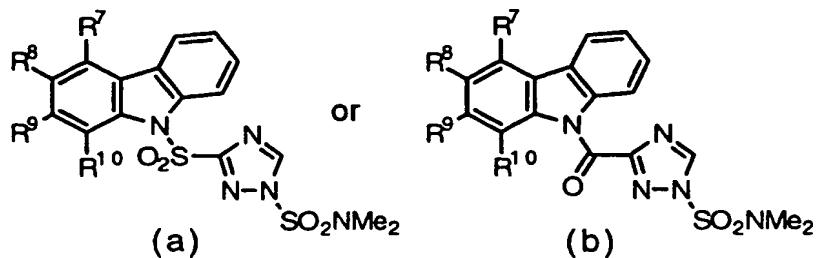


Compound No.	R ⁷	R ⁸	R ⁹	R ¹⁰
2-1	F	H	H	H
2-2	H	F	H	H
2-3	H	H	F	H
2-4	H	H	H	F
2-5	Cl	H	H	H
2-6	H	Cl	H	H
2-7	H	H	Cl	H
2-8	H	H	H	Cl

Table 2 (continue)

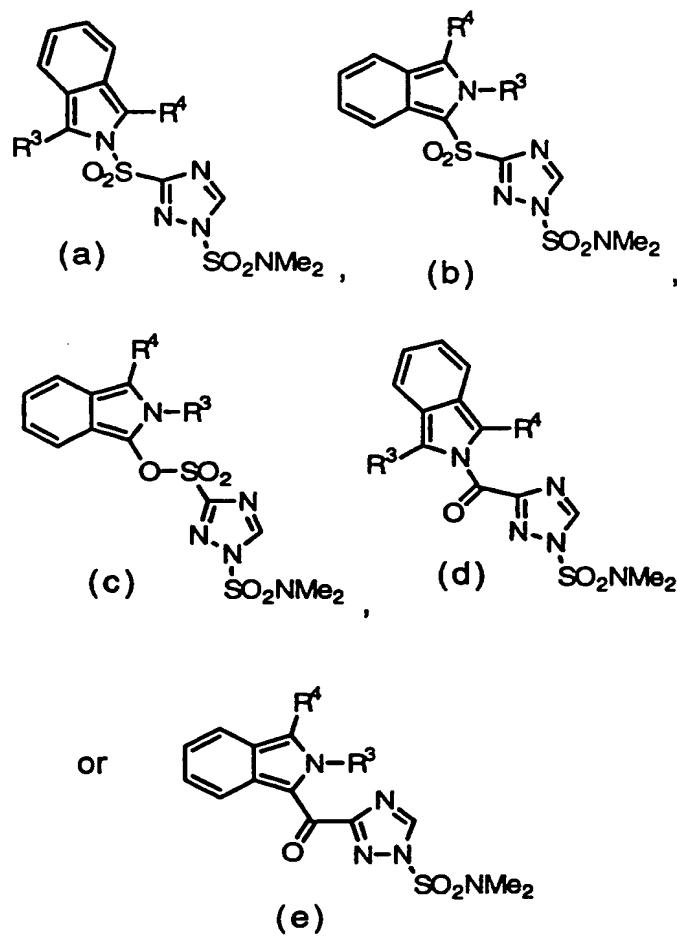
Compound No.	R ⁷	R ⁸	R ⁹	R ¹⁰
2-9	Br	H	H	H
2-10	H	Br	H	H
2-11	H	H	Br	H
2-12	H	H	H	Br
2-13	I	H	H	H
2-14	H	I	H	H
2-15	H	H	I	H
2-16	H	H	H	I
2-17	Me	H	H	H
2-18	H	Me	H	H
2-19	H	H	Me	H
2-20	H	H	H	Me
2-21	Et	H	H	H
2-22	H	Et	H	H
2-23	H	H	Et	H
2-24	H	H	H	Et
2-25	MeO	H	H	H
2-26	H	MeO	H	H
2-27	H	H	MeO	H
2-28	H	H	H	MeO
2-29	NO ₂	H	H	H
2-30	H	NO ₂	H	H
2-31	H	H	NO ₂	H
2-32	H	H	H	NO ₂
2-33	CN	H	H	H
2-34	H	CN	H	H
2-35	H	H	CN	H
2-36	H	H	H	CN
2-37	CF ₃	H	H	H
2-38	H	CF ₃	H	H
2-39	H	H	CF ₃	H
2-40	H	H	H	CF ₃
2-41	CO ₂ Me	H	H	H
2-42	H	CO ₂ Me	H	H
2-43	H	H	CO ₂ Me	H
2-44	H	H	H	CO ₂ Me

Table 3



Compound No.	R ⁷	R ⁸	R ⁹	R ¹⁰
3-1	H	H	H	H
3-2	F	H	H	H
3-3	H	F	H	H
3-4	H	H	F	H
3-5	H	H	H	F
3-6	Cl	H	H	H
3-7	H	Cl	H	H
3-8	H	H	Cl	H
3-9	H	H	H	Cl
3-10	Br	H	H	H
3-11	H	Br	H	H
3-12	H	H	Br	H
3-13	H	H	H	Br
3-14	Me	H	H	H
3-15	H	Me	H	H
3-16	H	H	Me	H
3-17	H	H	H	Me
3-18	CF ₃	H	H	H
3-19	H	CF ₃	H	H
3-20	H	H	CF ₃	H
3-21	H	H	H	CF ₃

Table 4

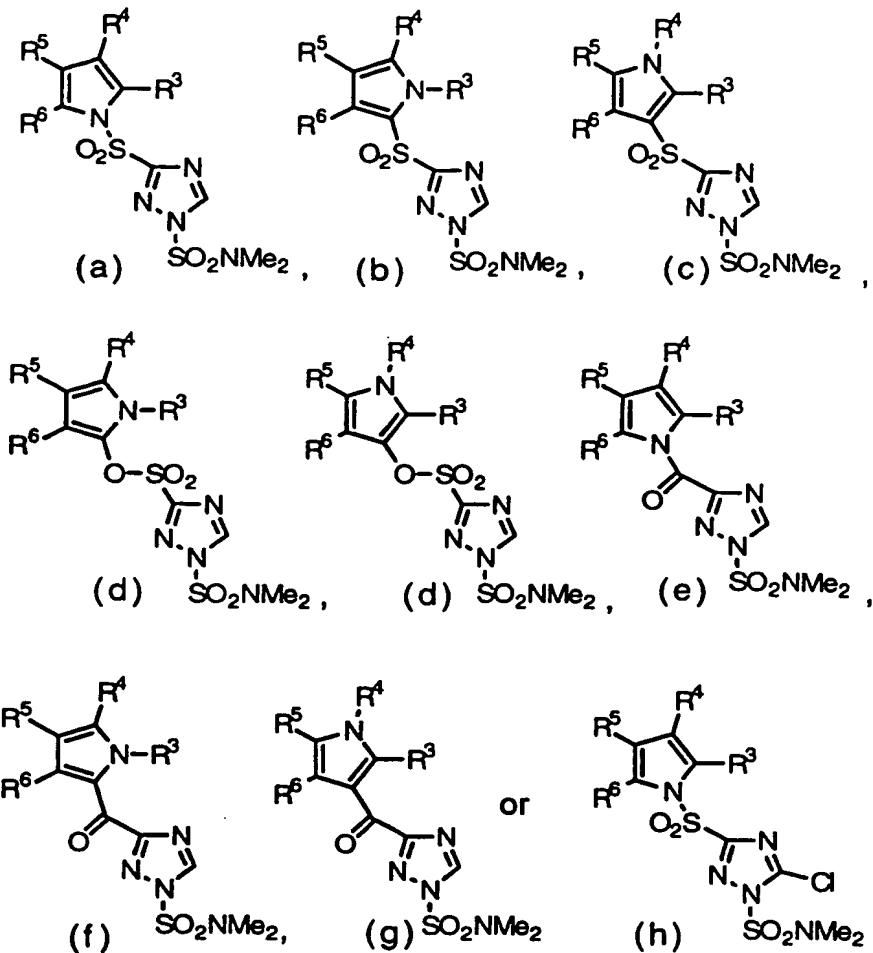


Compound No.	R^3	R^4
4-1	H	H
4-2	H	Me
4-3	H	Et
4-4	H	Cl
4-5	H	Br
4-6	H	CF_3
4-7	Me	H
4-8	Me	Me
4-9	Me	Et
4-10	Me	Cl
4-11	Me	Br
4-12	Me	CF_3
4-13	Et	H
4-14	Et	Me

Table 4 (continue)

Compound No.	R ³	R ⁴
4-15	Et	Et
4-16	Et	Cl
4-17	Et	Br
4-18	Et	CF ₃
4-19	Cl	H
4-20	Cl	Me
4-21	Cl	Et
4-22	Cl	Cl
4-23	Cl	Br
4-24	Cl	CF ₃
4-25	Br	H
4-26	Br	Me
4-27	Br	Et
4-28	Br	Br
4-29	Br	CF ₃

Table 5



Compound No.	R^3	R^4	R^5	R^6
5-1	H	Ph	H	H
5-2	Cl	Ph	H	H
5-3	H	Ph	Cl	H
5-4	H	Ph	H	Cl
5-5	Cl	Ph	Cl	H
5-6	Cl	Ph	H	Cl
5-7	H	Ph	Cl	Cl
5-8	Cl	Ph	Cl	Cl
5-9	Br	Ph	Cl	H
5-10	Cl	Ph	Br	H
5-11	Br	Ph	H	Cl
5-12	Cl	Ph	H	Br

Table 5 (continu)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-13	H	Ph	Br	Cl
5-14	H	Ph	Cl	Br
5-15	Br	Ph	Cl	Cl
5-16	Cl	Ph	Br	Cl
5-17	Cl	Ph	Cl	Br
5-18	Br	Ph	Br	Cl
5-19	Br	Ph	Cl	Br
5-20	Cl	Ph	Br	Br
5-21	Me	Ph	H	H
5-22	H	Ph	Me	H
5-23	H	Ph	H	Me
5-24	Me	Ph	Cl	H
5-25	Me	Ph	H	Cl
5-26	Me	Ph	Cl	Cl
5-27	Me	Ph	Br	Cl
5-28	Me	Ph	Cl	Br
5-29	Cl	Ph	Me	H
5-30	H	Ph	Me	Cl
5-31	Cl	Ph	Me	Cl
5-32	Br	Ph	Me	Cl
5-33	Cl	Ph	Me	Br
5-34	Cl	Ph	H	Me
5-35	H	Ph	Cl	Me
5-36	Cl	Ph	Cl	Me
5-37	Br	Ph	Cl	Me
5-38	Cl	Ph	Br	Me
5-39	Br	Ph	H	H
5-40	H	Ph	Br	H
5-41	H	Ph	H	Br
5-42	Br	Ph	Br	H
5-43	Br	Ph	H	Br
5-44	H	Ph	Br	Br
5-45	Br	Ph	Br	Br
5-46	Me	Ph	Br	H
5-47	Me	Ph	H	Br
5-48	Me	Ph	Br	Br
5-49	Br	Ph	Me	H
5-50	H	Ph	Me	Br
5-51	Br	Ph	Me	Br
5-52	Br	Ph	H	Me
5-53	H	Ph	Br	Me
5-54	Br	Ph	Br	Me
5-55	Me	Ph	Me	H
5-56	Me	Ph	Me	Cl
5-57	Me	Ph	Me	Br
5-58	H	Ph	Me	Me

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-59	Cl	Ph	Me	Me
5-60	Br	Ph	Me	Me
5-61	Me	Ph	H	Me
5-62	Me	Ph	Cl	Me
5-63	Me	Ph	Br	Me
5-64	CO ₂ Me	Ph	Me	H
5-65	Me	Ph	CO ₂ Me	H
5-66	CO ₂ Me	Ph	Me	Cl
5-67	Me	Ph	CO ₂ Me	Cl
5-68	CO ₂ Me	Ph	Me	Br
5-69	Me	Ph	CO ₂ Me	Br
5-70	Ac	Ph	Me	H
5-71	Me	Ph	Ac	H
5-72	Ac	Ph	Me	Cl
5-73	Me	Ph	Ac	Cl
5-74	Ac	Ph	Me	Br
5-75	Me	Ph	Ac	Br
5-76	CN	Ph	Me	H
5-77	Me	Ph	CN	H
5-78	CN	Ph	Me	Cl
5-79	Me	Ph	CN	Cl
5-80	CN	Ph	Me	Br
5-81	Me	Ph	CN	Br
5-82	H	Ph	CO ₂ Me	Me
5-83	H	Ph	Me	CO ₂ Me
5-84	Cl	Ph	CO ₂ Me	Me
5-85	Cl	Ph	Me	CO ₂ Me
5-86	Br	Ph	CO ₂ Me	Me
5-87	Br	Ph	Me	CO ₂ Me
5-88	H	Ph	Ac	Me
5-89	H	Ph	Me	Ac
5-90	Cl	Ph	Ac	Me
5-91	Cl	Ph	Me	Ac
5-92	Br	Ph	Ac	Me
5-93	Br	Ph	Me	Ac
5-94	H	Ph	CN	Me
5-95	H	Ph	Me	CN
5-96	Cl	Ph	CN	Me
5-97	Cl	Ph	Me	CN
5-98	Br	Ph	CN	Me
5-99	Br	Ph	Me	CN
5-100	CO ₂ Me	Ph	H	Me
5-101	Me	Ph	H	CO ₂ Me
5-102	CO ₂ Me	Ph	Cl	Me
5-103	Me	Ph	Cl	CO ₂ Me
5-104	CO ₂ Me	Ph	Br	Me

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-105	Me	Ph	Br	CO ₂ Me
5-106	Ac	Ph	H	Me
5-107	Me	Ph	H	Ac
5-108	Ac	Ph	Cl	Me
5-109	Me	Ph	Cl	Ac
5-110	Ac	Ph	Br	Me
5-111	Me	Ph	Br	Ac
5-112	CN	Ph	H	Me
5-113	Me	Ph	H	CN
5-114	CN	Ph	Cl	Me
5-115	Me	Ph	Cl	CN
5-116	CN	Ph	Br	Me
5-117	Me	Ph	Br	CN
5-118	Et	Ph	H	H
5-119	H	Ph	Et	H
5-120	H	Ph	H	Et
5-121	Et	Ph	Cl	H
5-122	Et	Ph	H	Cl
5-123	Et	Ph	Cl	Cl
5-124	Et	Ph	Br	Cl
5-125	Et	Ph	Cl	Br
5-126	Cl	Ph	Et	H
5-127	H	Ph	Et	Cl
5-128	Cl	Ph	Et	Cl
5-129	Br	Ph	Et	Cl
5-130	Cl	Ph	Et	Br
5-131	Cl	Ph	H	Et
5-132	H	Ph	Cl	Et
5-133	Cl	Ph	Cl	Et
5-134	Br	Ph	Cl	Et
5-135	Cl	Ph	Br	Et
5-136	Et	Ph	Br	H
5-137	Et	Ph	H	Br
5-138	Et	Ph	Br	Br
5-139	Br	Ph	Et	H
5-140	H	Ph	Et	Br
5-141	Br	Ph	Et	Br
5-142	Br	Ph	H	Et
5-143	H	Ph	Br	Et
5-144	Br	Ph	Br	Et
5-145	CN	Ph	H	H
5-146	H	Ph	CN	H
5-147	H	Ph	H	CN
5-148	CN	Ph	Cl	H
5-149	CN	Ph	H	Cl
5-150	CN	Ph	Cl	Cl

Table 5 (continu)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-151	CN	Ph	Br	Cl
5-152	CN	Ph	Cl	Br
5-153	Cl	Ph	CN	H
5-154	H	Ph	CN	Cl
5-155	Cl	Ph	CN	Cl
5-156	Br	Ph	CN	Cl
5-157	Cl	Ph	CN	Br
5-158	Cl	Ph	H	CN
5-159	H	Ph	Cl	CN
5-160	Br	Ph	H	CN
5-161	H	Ph	Br	CN
5-162	CN	Ph	Br	H
5-163	CN	Ph	H	Br
5-164	CN	Ph	Br	Br
5-165	Br	Ph	CN	H
5-166	H	Ph	CN	Br
5-167	Br	Ph	CN	Br
5-168	Cl	Ph	Cl	CN
5-169	Cl	Ph	Br	CN
5-170	Br	Ph	Cl	CN
5-171	Br	Ph	Br	CN
5-172	CF ₃	Ph	H	H
5-173	H	Ph	CF ₃	H
5-174	H	Ph	H	CF ₃
5-175	CF ₃	Ph	Cl	H
5-176	CF ₃	Ph	H	Cl
5-177	CF ₃	Ph	Cl	Cl
5-178	CF ₃	Ph	Br	Cl
5-179	CF ₃	Ph	Cl	Br
5-180	Cl	Ph	CF ₃	H
5-181	H	Ph	CF ₃	Cl
5-182	Cl	Ph	CF ₃	Cl
5-183	Br	Ph	CF ₃	Cl
5-184	Cl	Ph	CF ₃	Br
5-185	Cl	Ph	H	CF ₃
5-186	H	Ph	Cl	CF ₃
5-187	Cl	Ph	Cl	CF ₃
5-188	Br	Ph	Cl	CF ₃
5-189	Cl	Ph	Br	CF ₃
5-190	CF ₃	Ph	Br	H
5-191	CF ₃	Ph	H	Br
5-192	CF ₃	Ph	Br	Br
5-193	Br	Ph	CF ₃	H
5-194	H	Ph	CF ₃	Br
5-195	Br	Ph	CF ₃	Br
5-196	Br	Ph	H	CF ₃

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-197	H	Ph	Br	CF ₃
5-198	Br	Ph	Br	CF ₃
5-199	NO ₂	Ph	H	H
5-200	H	Ph	NO ₂	H
5-201	H	Ph	H	NO ₂
5-202	NO ₂	Ph	Cl	H
5-203	NO ₂	Ph	H	Cl
5-204	NO ₂	Ph	Cl	Cl
5-205	NO ₂	Ph	Br	Cl
5-206	NO ₂	Ph	Cl	Br
5-207	Cl	Ph	NO ₂	H
5-208	H	Ph	NO ₂	Cl
5-209	Cl	Ph	NO ₂	Cl
5-210	Br	Ph	NO ₂	Cl
5-211	Cl	Ph	NO ₂	Br
5-212	Cl	Ph	H	NO ₂
5-213	H	Ph	Cl	NO ₂
5-214	Cl	Ph	Cl	NO ₂
5-215	Br	Ph	Cl	NO ₂
5-216	Cl	Ph	Br	NO ₂
5-217	NO ₂	Ph	Br	H
5-218	NO ₂	Ph	H	Br
5-219	NO ₂	Ph	Br	Br
5-220	Br	Ph	NO ₂	H
5-221	H	Ph	NO ₂	Br
5-222	Br	Ph	NO ₂	Br
5-223	Br	Ph	H	NO ₂
5-224	H	Ph	Br	NO ₂
5-225	Br	Ph	Br	NO ₂
5-226	CO ₂ Me	Ph	H	H
5-227	H	Ph	CO ₂ Me	H
5-228	H	Ph	H	CO ₂ Me
5-229	CO ₂ Me	Ph	Cl	H
5-230	CO ₂ Me	Ph	H	Cl
5-231	CO ₂ Me	Ph	Cl	Cl
5-232	CO ₂ Me	Ph	Br	Cl
5-233	CO ₂ Me	Ph	Cl	Br
5-234	Cl	Ph	CO ₂ Me	H
5-235	H	Ph	CO ₂ Me	Cl
5-236	Cl	Ph	CO ₂ Me	Cl
5-237	Br	Ph	CO ₂ Me	Cl
5-238	Cl	Ph	CO ₂ Me	Br
5-239	Cl	Ph	H	CO ₂ Me
5-240	H	Ph	Cl	CO ₂ Me
5-241	Cl	Ph	Cl	CO ₂ Me
5-242	Br	Ph	Cl	CO ₂ Me

Table 5 (continu)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-243	Cl	Ph	Br	CO ₂ Me
5-244	CO ₂ Me	Ph	Br	H
5-245	CO ₂ Me	Ph	H	Br
5-246	CO ₂ Me	Ph	Br	Br
5-247	Br	Ph	CO ₂ Me	H
5-248	H	Ph	CO ₂ Me	Br
5-249	Br	Ph	CO ₂ Me	Br
5-250	Br	Ph	H	CO ₂ Me
5-251	H	Ph	Br	CO ₂ Me
5-252	Br	Ph	Br	CO ₂ Me
5-253	Ac	Ph	H	H
5-254	H	Ph	Ac	H
5-255	H	Ph	H	Ac
5-256	Ac	Ph	Cl	H
5-257	Ac	Ph	H	Cl
5-258	Ac	Ph	Cl	Cl
5-259	Ac	Ph	Br	Cl
5-260	Ac	Ph	Cl	Br
5-261	Cl	Ph	Ac	H
5-262	H	Ph	Ac	Cl
5-263	Cl	Ph	Ac	Cl
5-264	Br	Ph	Ac	Cl
5-265	Cl	Ph	Ac	Br
5-266	Cl	Ph	H	Ac
5-267	H	Ph	Cl	Ac
5-268	Cl	Ph	Cl	Ac
5-269	Br	Ph	Cl	Ac
5-270	Cl	Ph	Br	Ac
5-271	Ac	Ph	Br	H
5-272	Ac	Ph	H	Br
5-273	Ac	Ph	Br	Br
5-274	Br	Ph	Ac	H
5-275	H	Ph	Ac	Br
5-276	Br	Ph	Ac	Br
5-277	Br	Ph	H	Ac
5-278	H	Ph	Br	Ac
5-279	Br	Ph	Br	Ac
5-280	Ph	H	H	H
5-281	Ph	Cl	H	H
5-282	Ph	H	Cl	H
5-283	Ph	H	H	Cl
5-284	Ph	Cl	Cl	H
5-285	Ph	Br	Cl	H
5-286	Ph	Cl	Br	H
5-287	Ph	Cl	H	Cl
5-288	Ph	Br	H	Cl

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-289	Ph	Cl	H	Br
5-290	Ph	H	Cl	Cl
5-291	Ph	H	Br	Cl
5-292	Ph	H	Cl	Br
5-293	Ph	Cl	Cl	Cl
5-294	Ph	Br	Cl	Cl
5-295	Ph	Cl	Br	Cl
5-296	Ph	Cl	Cl	Br
5-297	Ph	Br	Br	Cl
5-298	Ph	Br	Cl	Br
5-299	Ph	Cl	Br	Br
5-300	Ph	Me	H	H
5-301	Ph	H	Me	H
5-302	Ph	H	H	Me
5-303	Ph	Me	Cl	H
5-304	Ph	Me	H	Cl
5-305	Ph	Me	Cl	Cl
5-306	Ph	Me	Br	Cl
5-307	Ph	Me	Cl	Br
5-308	Ph	Cl	Me	H
5-309	Ph	H	Me	Cl
5-310	Ph	Cl	Me	Cl
5-311	Ph	Cl	Me	Br
5-312	Ph	Cl	H	Me
5-313	Ph	H	Cl	Me
5-314	Ph	Cl	Cl	Me
5-315	Ph	Br	H	H
5-316	Ph	H	Br	H
5-317	Ph	H	H	Br
5-318	Ph	Br	Br	H
5-319	Ph	Br	H	Br
5-320	Ph	H	Br	Br
5-321	Ph	Br	Br	Br
5-322	Ph	Me	Br	H
5-323	Ph	Me	H	Br
5-324	Ph	Me	Br	Br
5-325	Ph	Br	Me	H
5-326	Ph	H	Me	Br
5-327	Ph	Br	Me	Br
5-328	Ph	Br	Me	Cl
5-329	Ph	Br	H	Me
5-330	Ph	H	Br	Me
5-331	Ph	Br	Br	Me
5-332	Ph	CN	H	H
5-333	Ph	H	CN	H
5-334	Ph	H	H	CN

Tabl 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-335	Ph	CN	Cl	H
5-336	Ph	CN	H	Cl
5-337	Ph	CN	Cl	Cl
5-338	Ph	CN	Br	Cl
5-339	Ph	CN	Cl	Br
5-340	Ph	Cl	CN	H
5-341	Ph	H	CN	Cl
5-342	Ph	Cl	CN	Cl
5-343	Ph	Br	CN	Cl
5-344	Ph	Cl	CN	Br
5-345	Ph	Cl	H	CN
5-346	Ph	H	Cl	CN
5-347	Ph	Cl	Cl	CN
5-348	Ph	Br	Cl	CN
5-349	Ph	Cl	Br	CN
5-350	Ph	CN	Br	H
5-351	Ph	CN	H	Br
5-352	Ph	CN	Br	Br
5-353	Ph	Br	CN	H
5-354	Ph	H	CN	Br
5-355	Ph	Br	CN	Br
5-356	Ph	Br	H	CN
5-357	Ph	H	Br	CN
5-358	Ph	Br	Br	CN
5-359	Ph	CF ₃	H	H
5-360	Ph	H	CF ₃	H
5-361	Ph	H	H	CF ₃
5-362	Ph	CF ₃	Cl	H
5-363	Ph	CF ₃	H	Cl
5-364	Ph	CF ₃	Cl	Cl
5-365	Ph	CF ₃	Br	Cl
5-366	Ph	CF ₃	Cl	Br
5-367	Ph	Cl	CF ₃	H
5-368	Ph	H	CF ₃	Cl
5-369	Ph	Cl	CF ₃	Cl
5-370	Ph	Br	CF ₃	Cl
5-371	Ph	Cl	CF ₃	Br
5-372	Ph	Cl	H	CF ₃
5-373	Ph	H	Cl	CF ₃
5-374	Ph	Cl	Cl	CF ₃
5-375	Ph	Br	Cl	CF ₃
5-376	Ph	Cl	Br	CF ₃
5-377	Ph	CF ₃	Br	H
5-378	Ph	CF ₃	H	Br
5-379	Ph	CF ₃	Br	Br
5-380	Ph	Br	CF ₃	H

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-381	Ph	H	CF ₃	Br
5-382	Ph	Br	CF ₃	Br
5-383	Ph	Br	H	CF ₃
5-384	Ph	H	Br	CF ₃
5-385	Ph	Br	Br	CF ₃
5-386	Ph	NO ₂	H	H
5-387	Ph	H	NO ₂	H
5-388	Ph	H	H	NO ₂
5-389	Ph	NO ₂	Cl	H
5-390	Ph	NO ₂	H	Cl
5-391	Ph	NO ₂	Cl	Cl
5-392	Ph	NO ₂	Br	Cl
5-393	Ph	NO ₂	Cl	Br
5-394	Ph	Cl	NO ₂	H
5-395	Ph	H	NO ₂	Cl
5-396	Ph	Cl	NO ₂	Cl
5-397	Ph	Br	NO ₂	Cl
5-398	Ph	Cl	NO ₂	Br
5-399	Ph	NO ₂	Br	H
5-400	Ph	NO ₂	H	Br
5-401	Ph	NO ₂	Br	Br
5-402	Ph	Br	NO ₂	H
5-403	Ph	H	NO ₂	Br
5-404	Ph	Br	NO ₂	Br
5-405	Ph	CO ₂ Me	H	H
5-406	Ph	H	CO ₂ Me	H
5-407	Ph	H	H	CO ₂ Me
5-408	Ph	CO ₂ Me	Cl	H
5-409	Ph	CO ₂ Me	H	Cl
5-410	Ph	CO ₂ Me	Cl	Cl
5-411	Ph	CO ₂ Me	Br	Cl
5-412	Ph	CO ₂ Me	Cl	Br
5-413	Ph	Cl	CO ₂ Me	H
5-414	Ph	H	CO ₂ Me	Cl
5-415	Ph	Cl	CO ₂ Me	Cl
5-416	Ph	Br	CO ₂ Me	Cl
5-417	Ph	Cl	CO ₂ Me	Br
5-418	Ph	Cl	H	CO ₂ Me
5-419	Ph	H	Cl	CO ₂ Me
5-420	Ph	Cl	Cl	CO ₂ Me
5-421	Ph	Br	Cl	CO ₂ Me
5-422	Ph	Cl	Br	CO ₂ Me
5-423	Ph	Cl	Br	Me
5-424	Ph	Br	Cl	Me
5-425	Ph	CO ₂ Me	Br	H
5-426	Ph	CO ₂ Me	H	Br

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-427	Ph	CO ₂ Me	Br	Br
5-428	Ph	Br	CO ₂ Me	H
5-429	Ph	H	CO ₂ Me	Br
5-430	Ph	Br	CO ₂ Me	Br
5-431	Ph	Br	H	CO ₂ Me
5-432	Ph	H	Br	CO ₂ Me
5-433	Ph	Br	Br	CO ₂ Me
5-434	Ph	CO ₂ Et	Cl	H
5-435	Ph	CO ₂ Et	H	Cl
5-436	Ph	CO ₂ Et	Cl	Cl
5-437	Ph	CO ₂ Et	Br	Cl
5-438	Ph	CO ₂ Et	Cl	Br
5-439	Ph	CO ₂ Et	Br	Br
5-440	Ph	Cl	CO ₂ Et	H
5-441	Ph	H	CO ₂ Et	Cl
5-442	Ph	Cl	CO ₂ Et	Cl
5-443	Ph	Br	CO ₂ Et	Cl
5-444	Ph	Cl	CO ₂ Et	Br
5-445	Ph	Br	CO ₂ Et	Br
5-446	Ph	H	H	CO ₂ Et
5-447	Ph	Cl	H	CO ₂ Et
5-448	Ph	H	Cl	CO ₂ Et
5-449	Ph	Cl	Cl	CO ₂ Et
5-450	Ph	Cl	Br	CO ₂ Et
5-451	Ph	Br	Cl	CO ₂ Et
5-452	Ph	Br	Br	CO ₂ Et
5-453	Ph	H	H	Ac
5-454	Ph	Cl	H	Ac
5-455	Ph	H	Cl	Ac
5-456	Ph	Cl	Cl	Ac
5-457	Ph	H	H	Et
5-458	Ph	Cl	H	Et
5-459	Ph	H	Cl	Et
5-460	Ph	Cl	Cl	Et
5-461	Ph	H	H	Ph
5-462	Ph	Cl	H	Ph
5-463	Ph	H	Cl	Ph
5-464	Ph	Cl	Cl	Ph
5-465	Ph	Ph	H	H
5-466	H	Ph	Ph	H
5-467	H	Ph	H	Ph
5-468	Ph	Ph	Cl	H
5-469	Ph	Ph	H	Cl
5-470	Ph	Ph	Cl	Cl
5-471	Ph	Ph	Br	Cl
5-472	Ph	Ph	Cl	Br

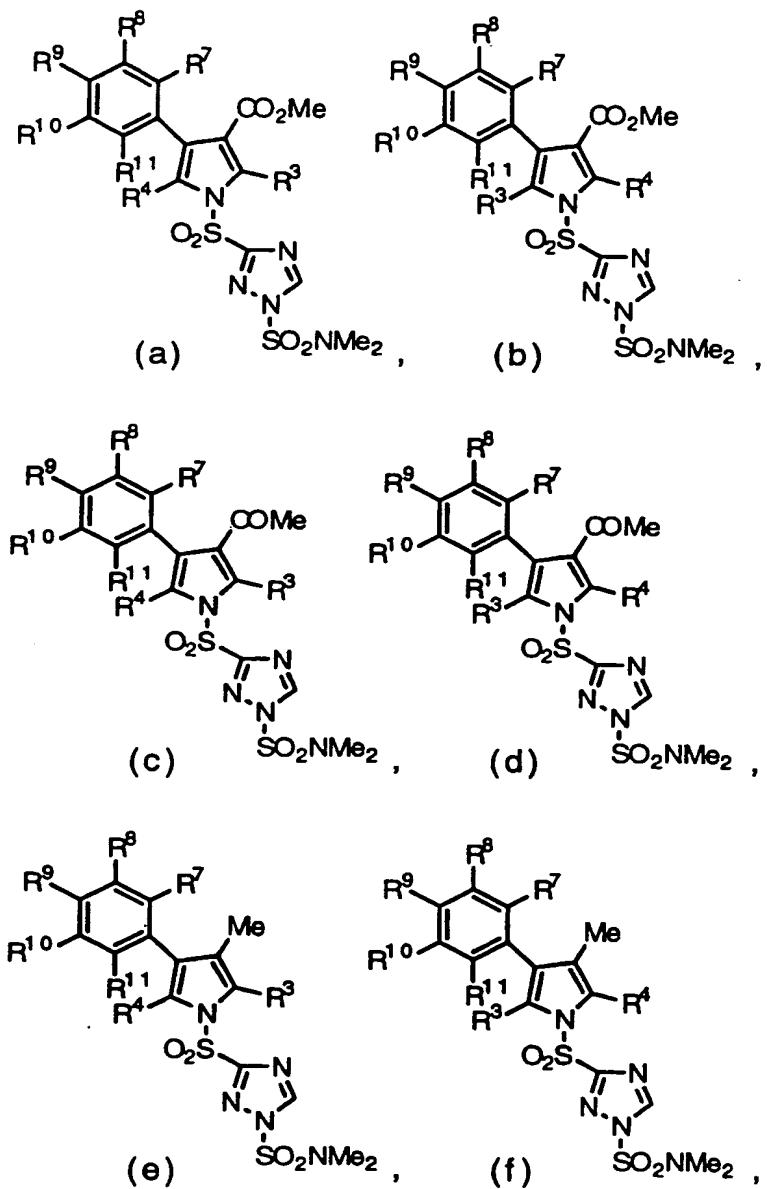
Table 5 (continue)

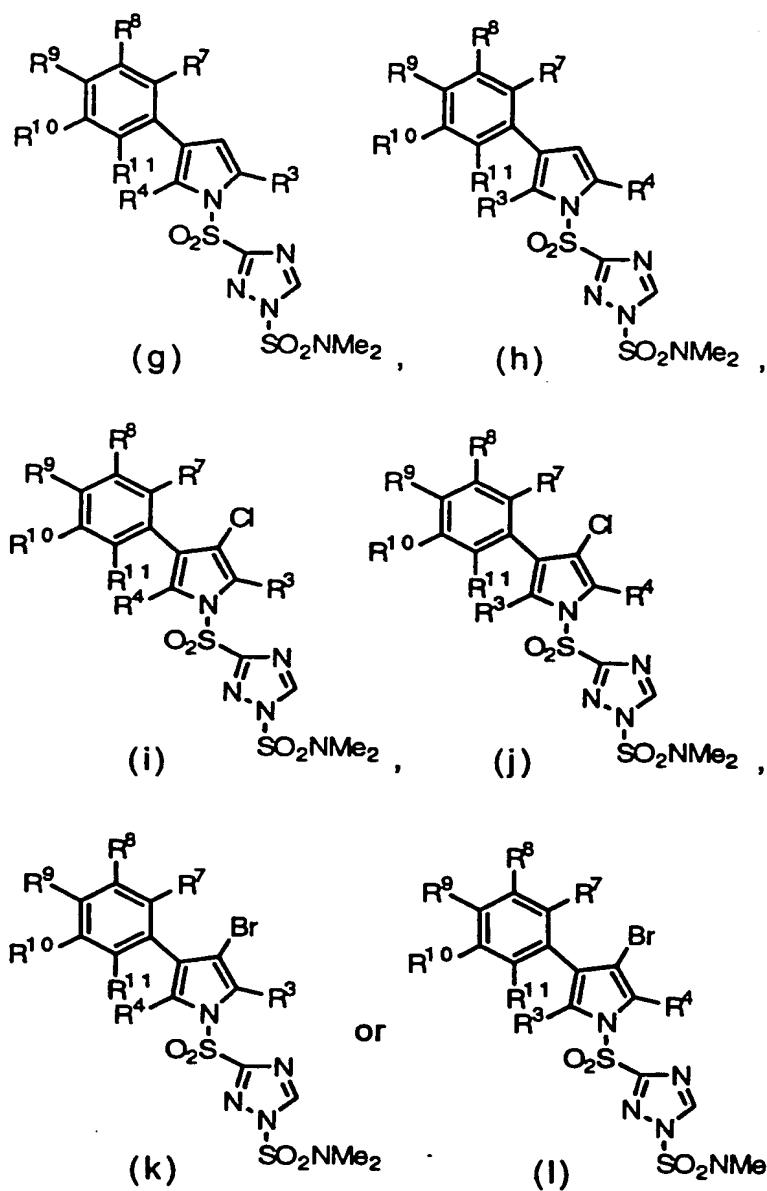
Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-473	Ph	Ph	Br	H
5-474	Ph	Ph	H	Br
5-475	Ph	Ph	Br	Br
5-476	Cl	Ph	Ph	H
5-477	Cl	Ph	Ph	Cl
5-478	Br	Ph	Ph	H
5-479	Br	Ph	Ph	Cl
5-480	Br	Ph	Ph	Br
5-481	Cl	Ph	H	Ph
5-482	H	Ph	Cl	Ph
5-483	Br	Ph	H	Ph
5-484	H	Ph	Br	Ph
5-485	Cl	Ph	Cl	Ph
5-486	Br	Ph	Cl	Ph
5-487	Cl	Ph	Br	Ph
5-488	Br	Ph	Br	Ph
5-489	CO ₂ Et	Ph	H	H
5-490	H	Ph	CO ₂ Et	H
5-491	H	Ph	H	CO ₂ Et
5-492	CO ₂ Et	Ph	Cl	H
5-493	CO ₂ Et	Ph	H	Cl
5-494	CO ₂ Et	Ph	Cl	Cl
5-495	Cl	Ph	CO ₂ Et	H
5-496	H	Ph	CO ₂ Et	Cl
5-497	Cl	Ph	CO ₂ Et	Cl
5-498	Cl	Ph	H	CO ₂ Et
5-499	H	Ph	Cl	CO ₂ Et
5-500	Cl	Ph	Cl	CO ₂ Et
5-501	CO ₂ Et	Ph	Br	H
5-502	CO ₂ Et	Ph	H	Br
5-503	CO ₂ Et	Ph	Cl	Br
5-504	CO ₂ Et	Ph	Br	Cl
5-505	CO ₂ Et	Ph	Br	Br
5-506	Br	Ph	CO ₂ Et	H
5-507	H	Ph	CO ₂ Et	Br
5-508	Br	Ph	CO ₂ Et	Br
5-509	Cl	Ph	CO ₂ Et	Br
5-510	Br	Ph	CO ₂ Et	Cl
5-511	Br	Ph	H	CO ₂ Et
5-512	H	Ph	Br	CO ₂ Et
5-513	Br	Ph	Br	CO ₂ Et
5-514	Cl	Ph	Br	CO ₂ Et
5-515	Br	Ph	Cl	CO ₂ Et
5-516	H	Ph	CO ₂ Et	Me
5-517	Cl	Ph	CO ₂ Et	Me
5-518	Br	Ph	CO ₂ Et	Me

Table 5 (continue)

Compound No.	R ³	R ⁴	R ⁵	R ⁶
5-519	Me	Ph	CO ₂ Et	H
5-520	Me	Ph	CO ₂ Et	Cl
5-521	Me	Ph	CO ₂ Et	Br
5-522	Ph	H	H	NO ₂
5-523	Ph	Cl	H	NO ₂
5-524	Ph	H	Cl	NO ₂
5-525	Ph	Cl	Cl	NO ₂

Table 6





Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
6-1	H	H	Me	H	H	H	H
6-2	H	H	H	Me	H	H	H
6-3	H	H	H	H	Me	H	H
6-4	H	H	Cl	H	H	H	H
6-5	H	H	H	Cl	H	H	H
6-6	H	H	H	H	Cl	H	H
6-7	H	H	Br	H	H	H	H
6-8	H	H	H	Br	H	H	H

Table 6 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
6-9	H	H	H	H	Br	H	H
6-10	H	H	CF ₃	H	H	H	H
6-11	H	H	H	CF ₃	H	H	H
6-12	H	H	H	H	CF ₃	H	H
6-13	H	Cl	Me	H	H	H	H
6-14	H	Cl	H	Me	H	H	H
6-15	H	Cl	H	H	Me	H	H
6-16	H	Cl	Cl	H	H	H	H
6-17	H	Cl	H	Cl	H	H	H
6-18	H	Cl	H	H	Cl	H	H
6-19	H	Cl	Br	H	H	H	H
6-20	H	Cl	H	Br	H	H	H
6-21	H	Cl	H	H	Br	H	H
6-22	H	Cl	CF ₃	H	H	H	H
6-23	H	Cl	H	CF ₃	H	H	H
6-24	H	Cl	H	H	CF ₃	H	H
6-25	H	Br	Me	H	H	H	H
6-26	H	Br	H	Me	H	H	H
6-27	H	Br	H	H	Me	H	H
6-28	H	Br	Cl	H	H	H	H
6-29	H	Br	H	Cl	H	H	H
6-30	H	Br	H	H	Cl	H	H
6-31	H	Br	Br	H	H	H	H
6-32	H	Br	H	Br	H	H	H
6-33	H	Br	H	H	Br	H	H
6-34	H	Br	CF ₃	H	H	H	H
6-35	H	Br	H	CF ₃	H	H	H
6-36	H	Br	H	H	CF ₃	H	H
6-37	H	Me	Me	H	H	H	H
6-38	H	Me	H	Me	H	H	H
6-39	H	Me	H	H	Me	H	H
6-40	H	Me	Cl	H	H	H	H
6-41	H	Me	H	Cl	H	H	H
6-42	H	Me	H	H	Cl	H	H
6-43	H	Me	Br	H	H	H	H
6-44	H	Me	H	Br	H	H	H
6-45	H	Me	H	H	Br	H	H
6-46	H	Me	CF ₃	H	H	H	H
6-47	H	Me	H	CF ₃	H	H	H
6-48	H	Me	H	H	CF ₃	H	H
6-49	Me	Cl	Me	H	H	H	H
6-50	Me	Cl	H	Me	H	H	H
6-51	Me	Cl	H	H	Me	H	H
6-52	Me	Cl	Cl	H	H	H	H
6-53	Me	Cl	H	Cl	H	H	H
6-54	Me	Cl	H	H	Cl	H	H

Table 6 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
6-55	Me	Cl	Br	H	H	H	H
6-56	Me	Cl	H	Br	H	H	H
6-57	Me	Cl	H	H	Br	H	H
6-58	Me	Cl	CF ₃	H	H	H	H
6-59	Me	Cl	H	CF ₃	H	H	H
6-60	Me	Cl	H	H	CF ₃	H	H
6-61	Me	Br	Me	H	H	H	H
6-62	Me	Br	H	Me	H	H	H
6-63	Me	Br	H	H	Me	H	H
6-64	Me	Br	Cl	H	H	H	H
6-65	Me	Br	H	Cl	H	H	H
6-66	Me	Br	H	H	Cl	H	H
6-67	Me	Br	Br	H	H	H	H
6-68	Me	Br	H	Br	H	H	H
6-69	Me	Br	H	H	Br	H	H
6-70	Me	Br	CF ₃	H	H	H	H
6-71	Me	Br	H	CF ₃	H	H	H
6-72	Me	Br	H	H	CF ₃	H	H
6-73	Cl	Cl	Me	H	H	H	H
6-74	Cl	Cl	H	Me	H	H	H
6-75	Cl	Cl	H	H	Me	H	H
6-76	Cl	Cl	Cl	H	H	H	H
6-77	Cl	Cl	H	Cl	H	H	H
6-78	Cl	Cl	H	H	Cl	H	H
6-79	Cl	Cl	Br	H	H	H	H
6-80	Cl	Cl	H	Br	H	H	H
6-81	Cl	Cl	H	H	Br	H	H
6-82	Cl	Cl	CF ₃	H	H	H	H
6-83	Cl	Cl	H	CF ₃	H	H	H
6-84	Cl	Cl	H	H	CF ₃	H	H
6-85	Cl	Br	Me	H	H	H	H
6-86	Cl	Br	H	Me	H	H	H
6-87	Cl	Br	H	H	Me	H	H
6-88	Cl	Br	Cl	H	H	H	H
6-89	Cl	Br	H	Cl	H	H	H
6-90	Cl	Br	H	H	Cl	H	H
6-91	Cl	Br	Br	H	H	H	H
6-92	Cl	Br	H	Br	H	H	H
6-93	Cl	Br	H	H	Br	H	H
6-94	Cl	Br	CF ₃	H	H	H	H
6-95	Cl	Br	H	CF ₃	H	H	H
6-96	Cl	Br	H	H	CF ₃	H	H
6-97	Br	Br	Me	H	H	H	H
6-98	Br	Br	H	Me	H	H	H
6-99	Br	Br	H	H	Me	H	H
6-100	Br	Br	Cl	H	H	H	H

Table 6 (continue)

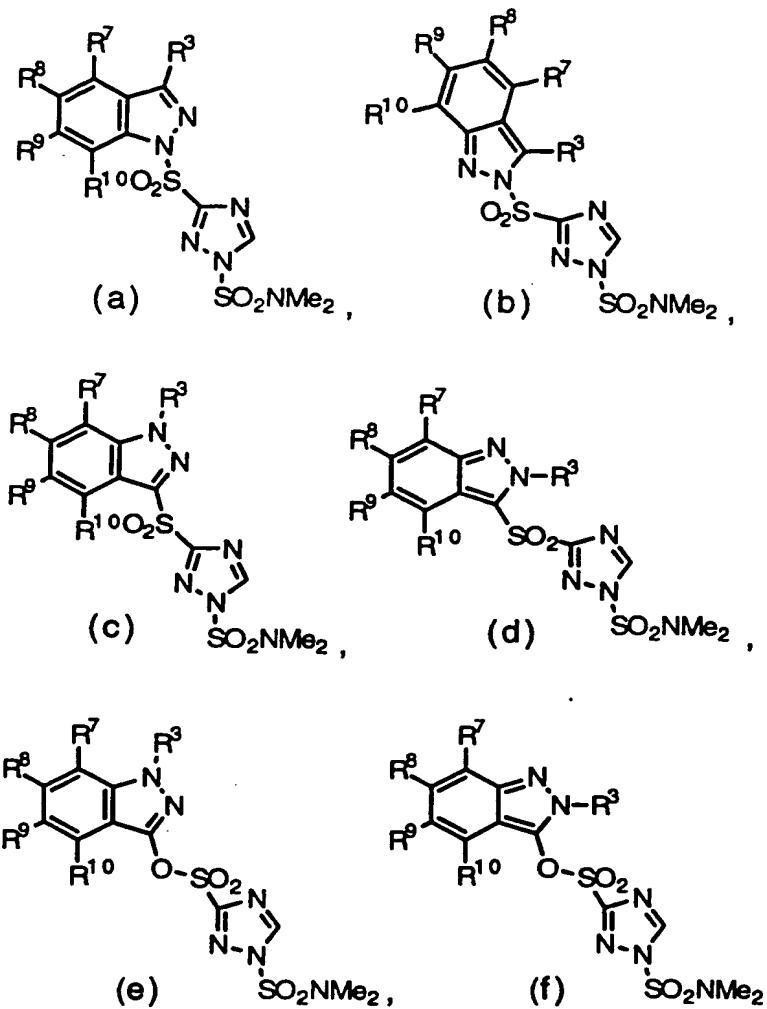
Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
6-101	Br	Br	H	Cl	H	H	H
6-102	Br	Br	H	H	Cl	H	H
6-103	Br	Br	Br	H	H	H	H
6-104	Br	Br	H	Br	H	H	H
6-105	Br	Br	H	H	Br	H	H
6-106	Br	Br	CF ₃	H	H	H	H
6-107	Br	Br	H	CF ₃	H	H	H
6-108	Br	Br	H	H	CF ₃	H	H
6-109	Me	Me	Me	H	H	H	H
6-110	Me	Me	H	Me	H	H	H
6-111	Me	Me	H	H	Me	H	H
6-112	Me	Me	Cl	H	H	H	H
6-113	Me	Me	H	Cl	H	H	H
6-114	Me	Me	H	H	Cl	H	H
6-115	Me	Me	Br	H	H	H	H
6-116	Me	Me	H	Br	H	H	H
6-117	Me	Me	H	H	Br	H	H
6-118	Me	Me	CF ₃	H	H	H	H
6-119	Me	Me	H	CF ₃	H	H	H
6-120	Me	Me	H	H	CF ₃	H	H
6-121	H	H	Me	Cl	H	H	H
6-122	H	H	Me	H	Cl	H	H
6-123	H	H	Me	H	H	Cl	H
6-124	H	H	Me	H	H	H	Cl
6-125	H	H	Cl	Me	H	H	H
6-126	H	H	H	Me	Cl	H	H
6-127	H	H	H	Me	H	Cl	H
6-128	H	H	H	Me	H	H	Cl
6-129	H	H	Cl	H	Me	H	H
6-130	H	H	H	Cl	Me	H	H
6-131	H	H	Cl	Cl	H	H	H
6-132	H	H	Cl	H	Cl	H	H
6-133	H	H	Cl	H	H	Cl	H
6-134	H	H	Cl	H	H	H	Cl
6-135	H	H	H	Cl	Cl	H	H
6-136	H	H	H	Cl	H	Cl	H
6-137	H	H	CF ₃	Cl	H	H	H
6-138	H	H	CF ₃	H	Cl	H	H
6-139	H	H	CF ₃	H	H	Cl	H
6-140	H	H	CF ₃	H	H	H	Cl
6-141	H	H	Cl	CF ₃	H	H	H
6-142	H	H	H	CF ₃	Cl	H	H
6-143	H	H	H	CF ₃	H	Cl	H
6-144	H	H	H	CF ₃	H	H	Cl
6-145	H	H	Cl	H	CF ₃	H	H
6-146	H	H	H	Cl	CF ₃	H	H

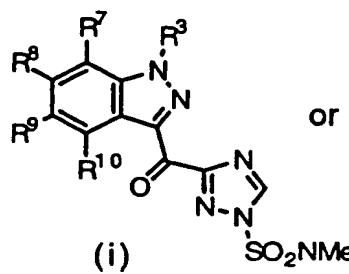
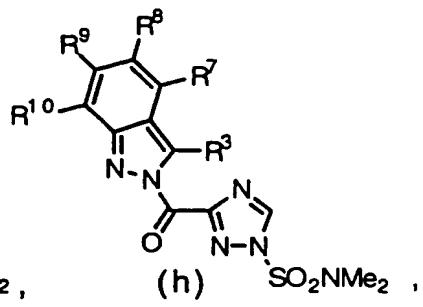
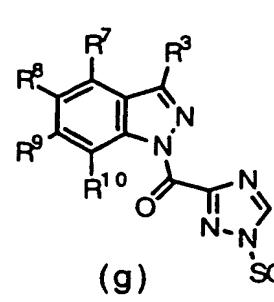
Table 6 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
6-147	H	Cl	Me	Cl	H	H	H
6-148	H	Cl	Me	H	Cl	H	H
6-149	H	Cl	Me	H	H	Cl	H
6-150	H	Cl	Me	H	H	H	Cl
6-151	H	Cl	Cl	Me	H	H	H
6-152	H	Cl	H	Me	Cl	H	H
6-153	H	Cl	H	Me	H	Cl	H
6-154	H	Cl	H	Me	H	H	Cl
6-155	H	Cl	Cl	H	Me	H	H
6-156	H	Cl	H	Cl	Me	H	H
6-157	H	Cl	Cl	Cl	H	H	H
6-158	H	Cl	Cl	H	Cl	H	H
6-159	H	Cl	Cl	H	H	Cl	H
6-160	H	Cl	Cl	H	H	H	Cl
6-161	H	Cl	H	Cl	Cl	H	H
6-162	H	Cl	H	Cl	H	Cl	H
6-163	H	Br	Me	Cl	H	H	H
6-164	H	Br	Me	H	Cl	H	H
6-165	H	Br	Me	H	H	Cl	H
6-166	H	Br	Me	H	H	H	Cl
6-167	H	Br	Cl	Me	H	H	H
6-168	H	Br	H	Me	Cl	H	H
6-169	H	Br	H	Me	H	Cl	H
6-170	H	Br	H	Me	H	H	Cl
6-171	H	Br	Cl	H	Me	H	H
6-172	H	Br	H	Cl	Me	H	H
6-173	H	Br	Cl	Cl	H	H	H
6-174	H	Br	Cl	H	Cl	H	H
6-175	H	Br	Cl	H	H	Cl	H
6-176	H	Br	Cl	H	H	H	Cl
6-177	H	Br	H	Cl	Cl	H	H
6-178	H	Br	H	Cl	H	Cl	H
6-179	H	Me	Me	Cl	H	H	H
6-180	H	Me	Me	H	Cl	H	H
6-181	H	Me	Me	H	H	Cl	H
6-182	H	Me	Me	H	H	H	Cl
6-183	H	Me	Cl	Me	H	H	H
6-184	H	Me	H	Me	Cl	H	H
6-185	H	Me	H	Me	H	Cl	H
6-186	H	Me	H	Me	H	H	Cl
6-187	H	Me	Cl	H	Me	H	H
6-188	H	Me	H	Cl	Me	H	H
6-189	H	Me	Cl	Cl	H	H	H
6-190	H	Me	Cl	H	Cl	H	H
6-191	H	Me	Cl	H	H	Cl	H
6-192	H	Me	Cl	H	H	H	Cl

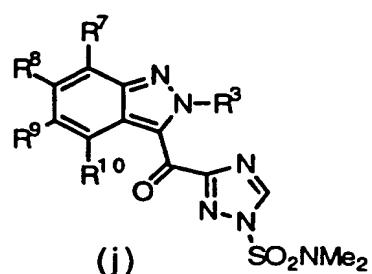
6-193	H	Me	H	C1	C1	H	H
6-194	H	Me	H	C1	H	C1	H
6-195	C1	Me	Me	C1	H	H	H
6-196	C1	Me	Me	H	C1	H	H
6-197	C1	Me	Me	H	H	C1	H
6-198	C1	Me	Me	H	H	H	C1
6-199	C1	Me	C1	Me	H	H	H
6-200	C1	Me	H	Me	C1	H	H
6-201	C1	Me	H	Me	H	C1	H
6-202	C1	Me	H	Me	H	H	C1
6-203	C1	Me	C1	H	Me	H	H
6-204	C1	Me	H	C1	Me	H	H
6-205	C1	Me	C1	C1	H	H	H
6-206	C1	Me	C1	H	C1	H	H
6-207	C1	Me	C1	H	H	C1	H
6-208	C1	Me	C1	H	H	H	C1
6-209	C1	Me	H	C1	C1	H	H
6-210	C1	Me	H	C1	H	C1	H
6-211	Br	Me	Me	C1	H	H	H
6-212	Br	Me	Me	H	C1	H	H
6-213	Br	Me	Me	H	H	C1	H
6-214	Br	Me	Me	H	H	H	C1
6-215	Br	Me	C1	Me	H	H	H
6-216	Br	Me	H	Me	C1	H	H
6-217	Br	Me	H	Me	H	C1	H
6-218	Br	Me	H	Me	H	H	C1
6-219	Br	Me	C1	H	Me	H	H
6-220	Br	Me	H	C1	Me	H	H
6-221	Br	Me	C1	C1	H	H	H
6-222	Br	Me	C1	H	C1	H	H
6-223	Br	Me	C1	H	H	C1	H
6-224	Br	Me	C1	H	H	H	C1
6-225	Br	Me	H	C1	C1	H	H
6-226	Br	Me	H	C1	H	C1	H

Table 7



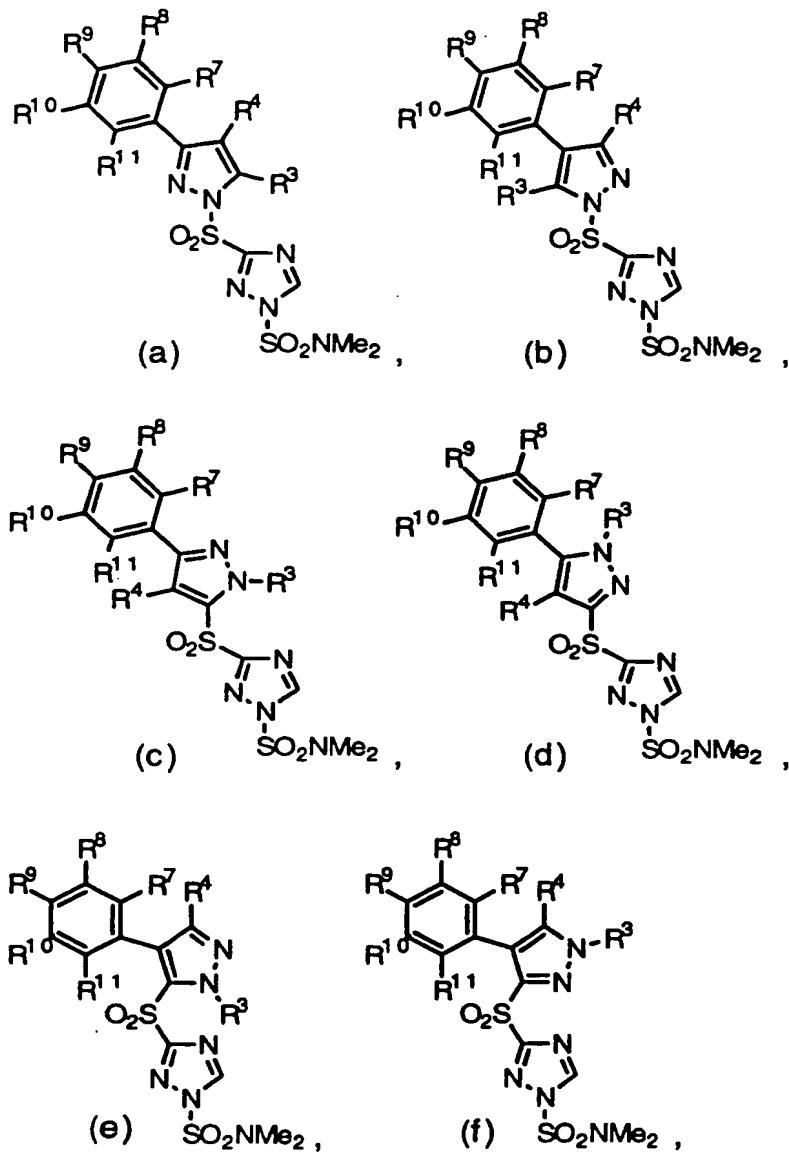


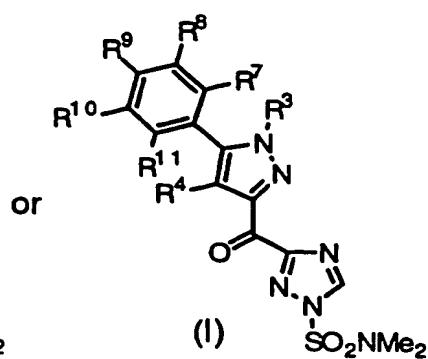
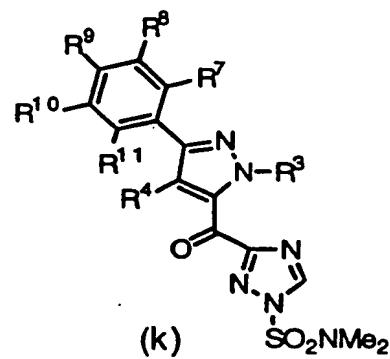
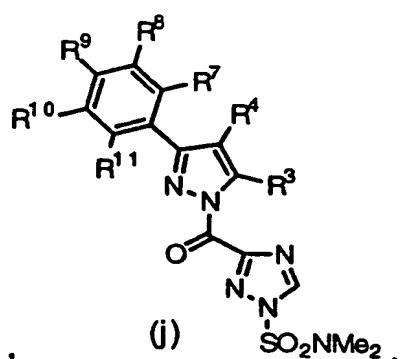
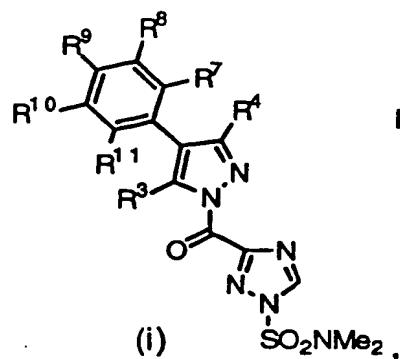
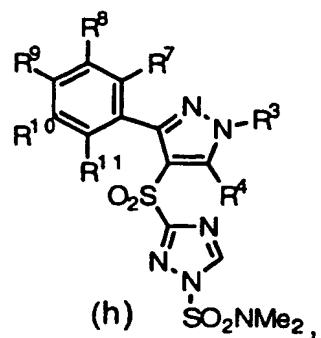
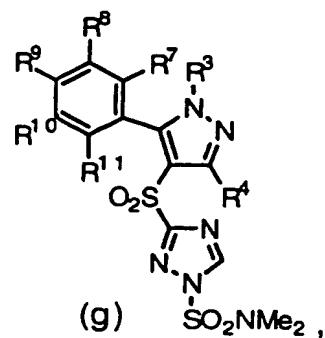
or



Compound No.	R ³	R ⁷	R ⁸	R ⁹	R ¹⁰
7-1	H	H	H	H	H
7-2	Me	H	H	H	H
7-3	Et	H	H	H	H
7-4	Ph	H	H	H	H
7-5	Cl	H	H	H	H
7-6	Br	H	H	H	H
7-7	CF ₃	H	H	H	H
7-8	H	Cl	H	H	H
7-9	H	H	Cl	H	H
7-10	H	H	H	Cl	H
7-11	H	H	H	H	Cl
7-12	H	Br	H	H	H
7-13	H	H	Br	H	H
7-14	H	H	H	Br	H
7-15	H	H	H	H	Br

Table 8





Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
8-1	H	H	H	H	H	H	H
8-2	H	Cl	H	H	H	H	H
8-3	H	Br	H	H	H	H	H
8-4	H	NO ₂	H	H	H	H	H
8-5	H	CO ₂ Me	H	H	H	H	H
8-6	H	CN	H	H	H	H	H
8-7	H	Me	H	H	H	H	H
8-8	H	Et	H	H	H	H	H

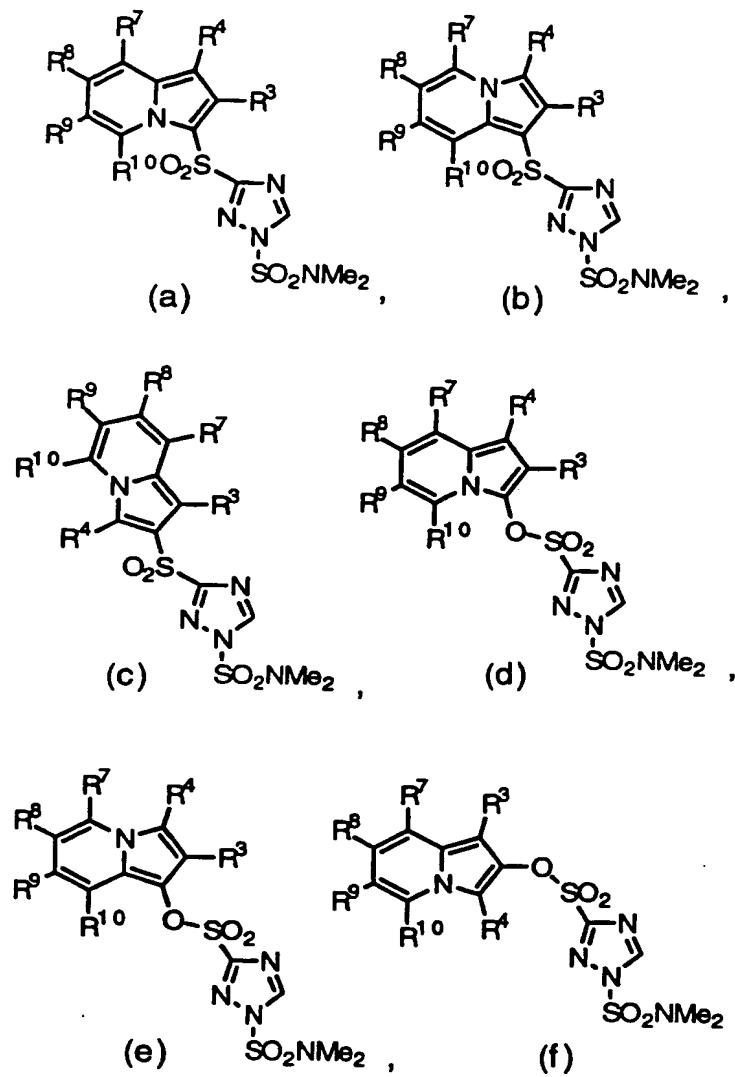
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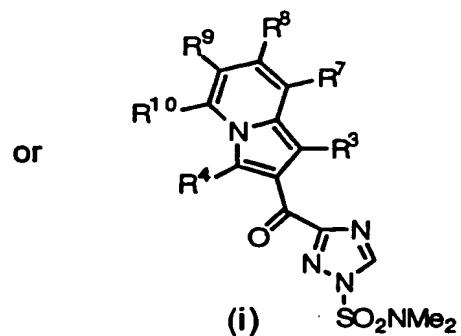
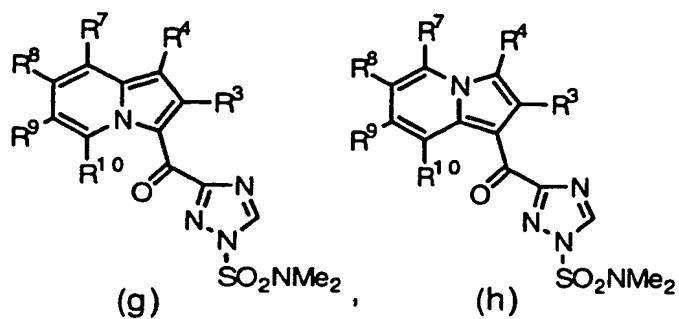
Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
8-9	H	Ph	H	H	H	H	H
8-10	Me	H	H	H	H	H	H
8-11	Me	Cl	H	H	H	H	H
8-12	Me	Br	H	H	H	H	H
8-13	Me	NO ₂	H	H	H	H	H
8-14	Me	CO ₂ Me	H	H	H	H	H
8-15	Me	CN	H	H	H	H	H
8-16	Me	Me	H	H	H	H	H
8-17	Me	Et	H	H	H	H	H
8-18	Me	Ph	H	H	H	H	H
8-19	Et	H	H	H	H	H	H
8-20	Et	Cl	H	H	H	H	H
8-21	Et	Br	H	H	H	H	H
8-22	Et	NO ₂	H	H	H	H	H
8-23	Et	CO ₂ Me	H	H	H	H	H
8-24	Et	CN	H	H	H	H	H
8-25	Et	Me	H	H	H	H	H
8-26	Et	Et	H	H	H	H	H
8-27	Et	Ph	H	H	H	H	H
8-28	n-Pr	H	H	H	H	H	H
8-29	n-Pr	Cl	H	H	H	H	H
8-30	n-Pr	Br	H	H	H	H	H
8-31	n-Pr	NO ₂	H	H	H	H	H
8-32	n-Pr	CO ₂ Me	H	H	H	H	H
8-33	n-Pr	CN	H	H	H	H	H
8-34	n-Pr	Me	H	H	H	H	H
8-35	n-Pr	Et	H	H	H	H	H
8-36	n-Pr	Ph	H	H	H	H	H
8-37	Cl	H	H	H	H	H	H
8-38	Cl	Cl	H	H	H	H	H
8-39	Cl	Br	H	H	H	H	H
8-40	Cl	NO ₂	H	H	H	H	H
8-41	Cl	CO ₂ Me	H	H	H	H	H
8-42	Cl	CN	H	H	H	H	H
8-43	Cl	Me	H	H	H	H	H
8-44	Cl	Et	H	H	H	H	H
8-45	Cl	Ph	H	H	H	H	H
8-46	Br	H	H	H	H	H	H
8-47	Br	Cl	H	H	H	H	H
8-48	Br	Br	H	H	H	H	H
8-49	Br	NO ₂	H	H	H	H	H
8-50	Br	CO ₂ Me	H	H	H	H	H
8-51	Br	CN	H	H	H	H	H
8-52	Br	Me	H	H	H	H	H
8-53	Br	Et	H	H	H	H	H
8-54	Br	Ph	H	H	H	H	H

Table 8 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
8-55	CF ₃	H	H	H	H	H	H
8-56	CF ₃	Cl	H	H	H	H	H
8-57	CF ₃	Br	H	H	H	H	H
8-58	CF ₃	NO ₂	H	H	H	H	H
8-59	CF ₃	CO ₂ Me	H	H	H	H	H
8-60	CF ₃	CN	H	H	H	H	H
8-61	CF ₃	Me	H	H	H	H	H
8-62	CF ₃	Et	H	H	H	H	H
8-63	CF ₃	Ph	H	H	H	H	H
8-64	Ph	H	H	H	H	H	H
8-65	Ph	Cl	H	H	H	H	H
8-66	Ph	Br	H	H	H	H	H
8-67	Ph	NO ₂	H	H	H	H	H
8-68	Ph	CO ₂ Me	H	H	H	H	H
8-69	Ph	CN	H	H	H	H	H
8-70	Ph	Me	H	H	H	H	H
8-71	Ph	Et	H	H	H	H	H
8-72	Ph	Ph	H	H	H	H	H
8-73	Me	Cl	Me	H	H	H	H
8-74	Me	Cl	H	Me	H	H	H
8-75	Me	Cl	H	H	Me	H	H
8-76	Me	Cl	Cl	H	H	H	H
8-77	Me	Cl	H	Cl	H	H	H
8-78	Me	Cl	H	H	Cl	H	H
8-79	Me	Cl	Br	H	H	H	H
8-80	Me	Cl	H	Br	H	H	H
8-81	Me	Cl	H	H	Br	H	H
8-82	Me	Cl	CF ₃	H	H	H	H
8-83	Me	Cl	H	CF ₃	H	H	H
8-84	Me	Cl	H	H	CF ₃	H	H
8-85	Me	Br	Me	H	H	H	H
8-86	Me	Br	H	Me	H	H	H
8-87	Me	Br	H	H	Me	H	H
8-88	Me	Br	Cl	H	H	H	H
8-89	Me	Br	H	Cl	H	H	H
8-90	Me	Br	H	H	Cl	H	H
8-91	Me	Br	Br	H	H	H	H
8-92	Me	Br	H	Br	H	H	H
8-93	Me	Br	H	H	Br	H	H
8-94	Me	Br	CF ₃	H	H	H	H
8-95	Me	Br	H	CF ₃	H	H	H
8-96	Me	Br	H	H	CF ₃	H	H

Table 9





Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰
9-1	H	H	H	H	H	H
9-2	H	Cl	H	H	H	H
9-3	H	Br	H	H	H	H
9-4	H	NO ₂	H	H	H	H
9-5	H	CN	H	H	H	H
9-6	H	CF ₃	H	H	H	H
9-7	H	Me	H	H	H	H
9-8	H	Et	H	H	H	H
9-9	H	SMe	H	H	H	H
9-10	H	CO ₂ Me	H	H	H	H
9-11	Me	H	H	H	H	H
9-12	Me	Cl	H	H	H	H
9-13	Me	Br	H	H	H	H
9-14	Me	NO ₂	H	H	H	H
9-15	Me	CN	H	H	H	H
9-16	Me	CF ₃	H	H	H	H
9-17	Me	Me	H	H	H	H
9-18	Me	Et	H	H	H	H
9-19	Me	SMe	H	H	H	H
9-20	Me	CO ₂ Me	H	H	H	H
9-21	Et	H	H	H	H	H
9-22	Et	Cl	H	H	H	H

Table 9 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰
9-23	Et	Br	H	H	H	H
9-24	Et	NO ₂	H	H	H	H
9-25	Et	CN	H	H	H	H
9-26	Et	CF ₃	H	H	H	H
9-27	Et	Me	H	H	H	H
9-28	Et	Et	H	H	H	H
9-29	Et	SMe	H	H	H	H
9-30	Et	CO ₂ Me	H	H	H	H
9-31	Cl	H	H	H	H	H
9-32	Cl	Me	H	H	H	H
9-33	Cl	Et	H	H	H	H
9-34	Cl	CN	H	H	H	H
9-35	Cl	CF ₃	H	H	H	H
9-36	Cl	Cl	H	H	H	H
9-37	Cl	Br	H	H	H	H
9-38	Cl	NO ₂	H	H	H	H
9-39	Cl	SMe	H	H	H	H
9-40	Cl	CO ₂ Me	H	H	H	H
9-41	Br	H	H	H	H	H
9-42	Br	Me	H	H	H	H
9-43	Br	Et	H	H	H	H
9-44	Br	CN	H	H	H	H
9-45	Br	CF ₃	H	H	H	H
9-46	Br	Cl	H	H	H	H
9-47	Br	Br	H	H	H	H
9-48	Br	NO ₂	H	H	H	H
9-49	Br	SMe	H	H	H	H
9-50	Br	CO ₂ Me	H	H	H	H
9-51	CF ₃	H	H	H	H	H
9-52	CF ₃	Me	H	H	H	H
9-53	CF ₃	Et	H	H	H	H
9-54	CF ₃	CN	H	H	H	H
9-55	CF ₃	CF ₃	H	H	H	H
9-56	CF ₃	Cl	H	H	H	H
9-57	CF ₃	Br	H	H	H	H
9-58	CF ₃	NO ₂	H	H	H	H
9-59	CF ₃	SMe	H	H	H	H
9-60	CF ₃	CO ₂ Me	H	H	H	H
9-61	SMe	H	H	H	H	H
9-62	SMe	Cl	H	H	H	H
9-63	SMe	Br	H	H	H	H
9-64	SMe	NO ₂	H	H	H	H
9-65	SMe	CN	H	H	H	H
9-66	SMe	CF ₃	H	H	H	H
9-67	SMe	Me	H	H	H	H
9-68	SMe	Et	H	H	H	H

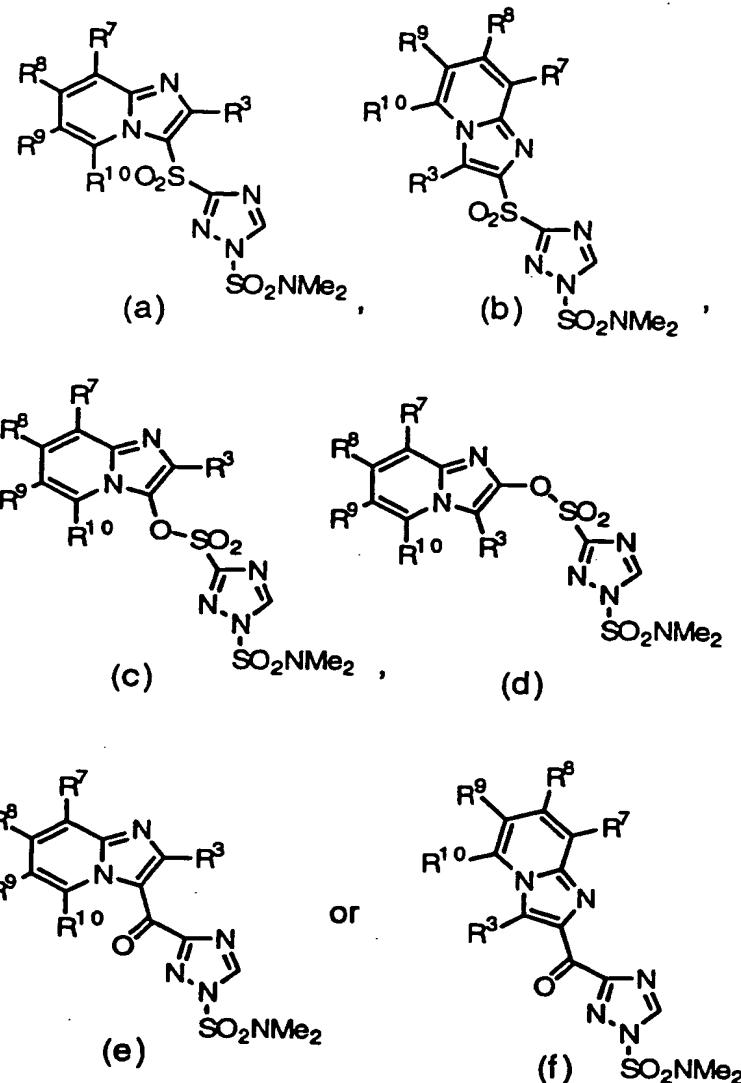
Table 9 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰
9-69	SMe	SMe	H	H	H	H
9-70	SMe	CO ₂ Me	H	H	H	H
9-71	CN	H	H	H	H	H
9-72	CN	Me	H	H	H	H
9-73	CN	Et	H	H	H	H
9-74	CN	CN	H	H	H	H
9-75	CN	CF ₃	H	H	H	H
9-76	CN	Cl	H	H	H	H
9-77	CN	Br	H	H	H	H
9-78	CN	NO ₂	H	H	H	H
9-79	CN	SMe	H	H	H	H
9-80	CN	CO ₂ Me	H	H	H	H
9-81	Me	H	Me	H	H	H
9-82	Me	H	H	Me	H	H
9-83	Me	H	H	H	Me	H
9-84	Me	H	H	H	H	Me
9-85	Me	H	F	H	H	H
9-86	Me	H	H	F	H	H
9-87	Me	H	H	H	F	H
9-88	Me	H	H	H	H	F
9-89	Me	H	Cl	H	H	H
9-90	Me	H	H	Cl	H	H
9-91	Me	H	H	H	Cl	H
9-92	Me	H	H	H	H	Cl
9-93	Me	H	Br	H	H	H
9-94	Me	H	H	Br	H	H
9-95	Me	H	H	H	Br	H
9-96	Me	H	H	H	H	Br
9-97	Me	Cl	Me	H	H	H
9-98	Me	Cl	H	Me	H	H
9-99	Me	Cl	H	H	Me	H
9-100	Me	Cl	H	H	H	Me
9-101	Me	Cl	F	H	H	H
9-102	Me	Cl	H	F	H	H
9-103	Me	Cl	H	H	F	H
9-104	Me	Cl	H	H	H	F
9-105	Me	Cl	Cl	H	H	H
9-106	Me	Cl	H	Cl	H	H
9-107	Me	Cl	H	H	Cl	H
9-108	Me	Cl	H	H	H	Cl
9-109	Me	Cl	Br	H	H	H
9-110	Me	Cl	H	Br	H	H
9-111	Me	Cl	H	H	Br	H
9-112	Me	Cl	H	H	H	Br
9-113	Me	Br	Me	H	H	H
9-114	Me	Br	H	Me	H	H

Table 9 (continue)

Compound No.	R ³	R ⁴	R ⁷	R ⁸	R ⁹	R ¹⁰
9-115	M	Br	H	H	Me	H
9-116	Me	Br	H	H	H	Me
9-117	Me	Br	F	H	H	H
9-118	Me	Br	H	F	H	H
9-119	Me	Br	H	H	F	H
9-120	Me	Br	H	H	H	F
9-121	Me	Br	Cl	H	H	H
9-122	Me	Br	H	Cl	H	H
9-123	Me	Br	H	H	Cl	H
9-124	Me	Br	H	H	H	Cl
9-125	Me	Br	Br	H	H	H
9-126	Me	Br	H	Br	H	H
9-127	Me	Br	H	H	Br	H
9-128	Me	Br	H	H	H	Br

Table 10



Compound No.	R ³	R ⁷	R ⁸	R ⁹	R ¹⁰
10-1	H	H	H	H	H
10-2	Me	H	H	H	H
10-3	Et	H	H	H	H
10-4	n-Pr	H	H	H	H
10-5	Cl	H	H	H	H
10-6	Br	H	H	H	H
10-7	Sme	H	H	H	H
10-8	CF ₃	H	H	H	H

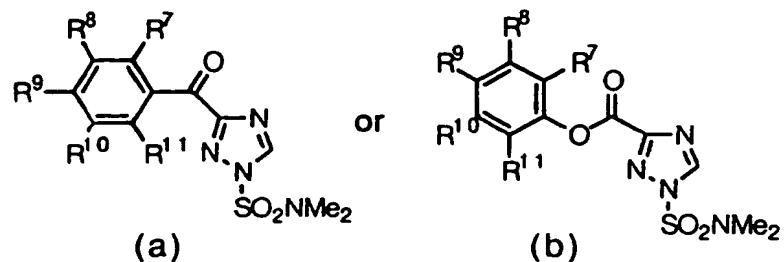
Table 10 (continue)

Compound No.	R ³	R ⁷	R ⁸	R ⁹	R ¹⁰
10-9	CN	H	H	H	H
10-10	H	Me	H	H	H
10-11	H	H	Me	H	H
10-12	H	H	H	Me	H
10-13	H	H	H	H	Me
10-14	H	F	H	H	H
10-15	H	H	F	H	H
10-16	H	H	H	F	H
10-17	H	H	H	H	F
10-18	H	Cl	H	H	H
10-19	H	H	Cl	H	H
10-20	H	H	H	Cl	H
10-21	H	H	H	H	Cl
10-22	H	Br	H	H	H
10-23	H	H	Br	H	H
10-24	H	H	H	Br	H
10-25	H	H	H	H	Br
10-26	Me	Me	H	H	H
10-27	Me	H	Me	H	H
10-28	Me	H	H	Me	H
10-29	Me	H	H	H	Me
10-30	Me	F	H	H	H
10-31	Me	H	F	H	H
10-32	Me	H	H	F	H
10-33	Me	H	H	H	F
10-34	Me	Cl	H	H	H
10-35	Me	H	Cl	H	H
10-36	Me	H	H	Cl	H
10-37	Me	H	H	H	Cl
10-38	Me	Br	H	H	H
10-39	Me	H	Br	H	H
10-40	Me	H	H	Br	H
10-41	Me	H	H	H	Br
10-42	Et	Me	H	H	H
10-43	Et	H	Me	H	H
10-44	Et	H	H	Me	H
10-45	Et	H	H	H	Me
10-46	Et	F	H	H	H
10-47	Et	H	F	H	H
10-48	Et	H	H	F	H
10-49	Et	H	H	H	F
10-50	Et	Cl	H	H	H
10-51	Et	H	Cl	H	H
10-52	Et	H	H	Cl	H
10-53	Et	H	H	H	Cl
10-54	Et	Br	H	H	H

Table 10 (continue)

Compound No.	R ³	R ⁷	R ⁸	R ⁹	R ¹⁰
10-55	Et	H	Br	H	H
10-56	Et	H	H	Br	H
10-57	Et	H	H	H	Br
10-58	Cl	Me	H	H	H
10-59	Cl	H	Me	H	H
10-60	Cl	H	H	Me	H
10-61	Cl	H	H	H	Me
10-62	Cl	F	H	H	H
10-63	Cl	H	F	H	H
10-64	Cl	H	H	F	H
10-65	Cl	H	H	H	F
10-66	Cl	Cl	H	H	H
10-67	Cl	H	Cl	H	H
10-68	Cl	H	H	Cl	H
10-69	Cl	H	H	H	Cl
10-70	Cl	Br	H	H	H
10-71	Cl	H	Br	H	H
10-72	Cl	H	H	Br	H
10-73	Cl	H	H	H	Br
10-74	Br	Me	H	H	H
10-75	Br	H	Me	H	H
10-76	Br	H	H	Me	H
10-77	Br	H	H	H	Me
10-78	Br	F	H	H	H
10-79	Br	H	F	H	H
10-80	Br	H	H	F	H
10-81	Br	H	H	H	F
10-82	Br	Cl	H	H	H
10-83	Br	H	Cl	H	H
10-84	Br	H	H	Cl	H
10-85	Br	H	H	H	Cl
10-86	Br	Br	H	H	H
10-87	Br	H	Br	H	H
10-88	Br	H	H	Br	H
10-89	Br	H	H	H	Br

Table 11



Compound No.	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
11-1	H	H	H	H	H
11-2	Me	H	H	H	H
11-3	H	Me	H	H	H
11-4	H	H	Me	H	H
11-5	Et	H	H	H	H
11-6	H	Et	H	H	H
11-7	H	H	Et	H	H
11-8	F	H	H	H	H
11-9	H	F	H	H	H
11-10	H	H	F	H	H
11-11	Cl	H	H	H	H
11-12	H	Cl	H	H	H
11-13	H	H	Cl	H	H
11-14	Br	H	H	H	H
11-15	H	Br	H	H	H
11-16	H	H	Br	H	H
11-17	CF ₃	H	H	H	H
11-18	H	CF ₃	H	H	H
11-19	H	H	CF ₃	H	H
11-20	OCF ₃	H	H	H	H
11-21	H	OCF ₃	H	H	H
11-22	H	H	OCF ₃	H	H
11-23	Ph	H	H	H	H
11-24	H	Ph	H	H	H
11-25	H	H	Ph	H	H
11-26	Oph	H	H	H	H
11-27	H	OPh	H	H	H
11-28	H	H	OPh	H	H
11-29	Bn	H	H	H	H
11-30	H	Bn	H	H	H
11-31	H	H	Bn	H	H
11-32	CO ₂ Me	H	H	H	H
11-33	H	CO ₂ M	H	H	H

Table 11 (continue)

Compound No.	R ⁷	R ⁸	R ⁹	R ¹⁰	R ¹¹
11-34	H	H	CO ₂ Me	H	H
11-35	CN	H	H	H	H
11-36	H	CN	H	H	H
11-37	H	H	CN	H	H
11-38	NO ₂	H	H	H	H
11-39	H	NO ₂	H	H	H
11-40	H	H	NO ₂	H	H
11-41	Ome	H	H	H	H
11-42	H	OMe	H	H	H
11-43	H	H	OMe	H	H
11-44	Me	Cl	H	H	H
11-45	Me	H	Cl	H	H
11-46	Me	H	H	Cl	H
11-47	Me	H	H	H	Cl
11-48	Cl	Me	H	H	H
11-49	H	Me	Cl	H	H
11-50	H	Me	H	Cl	H
11-51	H	Me	H	H	Cl
11-52	Cl	H	Me	H	H
11-53	H	Cl	Me	H	H
11-54	Me	Me	H	H	H
11-55	Me	H	Me	H	H
11-56	Me	H	H	Me	H
11-57	Me	H	H	H	Me
11-58	H	Me	Me	H	H
11-59	H	Me	H	Me	H
11-60	Cl	Cl	H	H	H
11-61	Cl	H	Cl	H	H
11-62	Cl	H	H	Cl	H
11-63	Cl	H	H	H	Cl
11-64	H	Cl	Cl	H	H
11-65	H	Cl	H	Cl	H

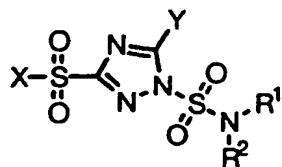
Next, methods for preparing the compound of the invention will be explained below. However, the present invention should not be construed as being limited thereto.

(Preparation Method 1)

The compound of the invention can be prepared by reacting a compound of the formula (2)



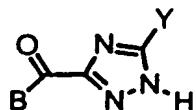
wherein A has the same meaning as defined above, with a compound of the formula (3)



wherein R^1 , R^2 and Y have the same meanings as defined above, and X is halogen.

(Preparation Method 2)

The compound of the invention can be prepared by reacting a compound of the formula (4)



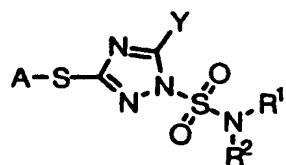
wherein B and Y have the same meanings as defined above, with a compound of the formula (5)



wherein R^1 and R^2 have the same meanings as defined above and X is halogen.

(Preparation Method 3)

The compound of the invention can be prepared by oxidizing a compound of the formula (6)



wherein R^1 , R^2 , A and Y have the same meanings as defined above, with an oxidizing agent.

In (Preparation Method 1), a sulfamoyl derivative (1) can be synthesized by reacting (2) with a halosulfonyltriazole (3) in the presence of a base.

The solvent may be any solvent so far as it is inert to the reaction. There may be employed, for example, ethers such as dioxane, dimethoxyethane and tetrahydrofuran, aromatic

hydrocarbons such as toluene, xylene and chlorobenzene, halogenated hydrocarbons such as dichloroethane and chloroform, ketones such as acetone, methyl ethyl ketone and methyl isobutyl ketone, nitriles such as acetonitrile, tertiary amines such as pyridine, triethylamine and tributylamine, amides such as N,N-dimethylformamide, sulfur compounds such as dimethyl sulfoxide and sulfolane, nitro compounds such as nitroethane and nitrobenzene, esters such as methyl acetate, or mixtures thereof. The reaction can be performed at a reaction temperature from -78°C to the boiling point of the solvent.

As for the base, there may be employed, for example, organic bases such as pyridine, 4-dimethylaminopyridine, triethylamine, diethylisopropylamine and N,N-diethylaniline, inorganic bases such as sodium hydroxide, potassium hydroxide, sodium carbonate, potassium carbonate, sodium hydrogen carbonate and potassium hydrogen carbonate, metal hydrides such as sodium hydride, metal alkoxides such as sodium methoxide and potassium t-butoxide, organic metal amides such as lithium diisopropylamide, organic metal compounds such as n-butyl lithium, and the like.

In the (Preparation Method 2), the sulfamoyl derivative (1) can be synthesized by reacting (4) with a dialkylsulfamoyl halide (5) in the presence of a base.

The solvent may be any solvent so far as it is inert to the reaction. There may be employed, for example, ethers such as dioxane, dimethoxyethane and tetrahydrofuran, aromatic hydrocarbons such as toluene, xylene and chlorobenzene, halogenated hydrocarbons such as dichloroethane and chloroform, ketones such as acetone, methyl ethyl ketone and methyl isobutyl ketone, nitriles such as acetonitrile, tertiary amines such as pyridine, triethylamine and tributylamine, amides such as N,N-dimethylformamide, sulfur compounds such as dimethyl sulfoxide and sulfolane, nitro compounds such as nitroethane and nitrobenzene, esters such as methyl acetate, or mixtures thereof. The reaction can be performed at a reaction temperature from -78°C to the boiling point of the solvent.

As for the base, there may be employed, for example, organic bases such as pyridine, 4-dimethylaminopyridine, triethylamine, diethylisopropylamine and N,N-diethylaniline, inorganic bases such as sodium hydroxide, potassium hydroxide, sodium carbonate, potassium carbonate, sodium hydrogen carbonate and potassium hydrogen carbonate, metal hydrides such as sodium hydride, metal alkoxides such as sodium methoxide and potassium t-butoxide, organic metal amides such as lithium diisopropylamide, organic metal compounds such as n-butyl lithium, and the like.

In the (Preparation Method 3), the sulfamoyl derivative (1) can be synthesized by oxidizing (6) with an oxidizing agent.

The solvent may be any solvent so far as it is inert to the reaction. There may be employed, for example, ethers such as dioxane, dimethoxyethane and tetrahydrofuran, aromatic hydrocarbons such as toluene, xylene and chlorobenzene, halogenated hydrocarbons such as dichloroethane and chloroform, ketones such as acetone, methyl ethyl ketone and methyl isobutyl ketone, nitriles such as acetonitrile, amides such as N,N-dimethylformamide, esters such as ethyl acetate, carboxylic acids such as acetic acid, water, or mixtures thereof. The reaction can be performed at a reaction temperature from -78°C to the boiling point of the solvent.

As for the oxidizing agent, there may be employed, for example, peroxides such as hydrogen peroxide, peracetic acid, 3-chloro perbenzoic acid, sodium percarbonate, and the like.

The starting compounds of the method, compounds (2), (3), (4) and (6) can be readily synthesized by known methods (see *Dai Yuki Kagaku* vol. 14, 299-514 for the compound (2), JP-A-5-43557 and/or JP-A-7-215971 for the compound (3), *Chem. Pharm. Bull.* 41(7) 1226-1231 (1993) for the compound (4), and JP-A-9-143181 for the compound (6).) or methods analogous thereto.

As for the plant diseases which are target for control by the compound of the invention, there may be mentioned: rice blast (*Pyricularia oryzae*), helminthosporium leaf spot (*Cochliobolus miyabeanus*), sheath blight (*Rhizoctonia solani*).

barley and wheat: powdery mildew (*Erysiphe graminis* f. sp. *hordei*, f. sp. *tritici*), stripe (*Pyrenophora graminea*), net blotch (*Pyrenophora teres*), scab (*Gibberella zaeae*), rust (*Puccinia striiformis*, *P. graminis*, *P. recondita*, *P. hordei*), snow blight (*Tipula* sp., *Micronectriella nivais*), loose smut (*Ustilago tritici*, *U. nuda*), eye spot (*Pseudocercosporella herpotrichoides*), scald (*Rhynchosporium secalis*), speckled leaf blotch (*Septoria tritici*), glume blotch (*Leptosphaeria nodorum*), citrus: melanose (*Diaporthe citri*), scab (*Elsinoe fawcetti*), green mold and blue mold (*Penicillium digitalatum*, *P. italicum*), apple: blossom blight (*Sclerotinia malii*), canker (*Valsa malii*), powdery mildew (*Podosphaera leucotricha*), alternaria leaf spot (*Alternaria malii*), scab (*Venturia inaequalis*), pear: scab (*Venturia nashicola*), black spot (*Alternaria kikuchiana*), rust (*Gymnosporangium haracanum*), peach: brown rot (*Sclerotinia cinerea*), scab (*Cladosporium carpophilum*), phomopsis rot (*Phomopsis* sp.), grape: downy mildew (*Plasmopara viticola*), anthracnose (*Elsinoe ampelina*), ripe rot (*Glomerella cingulata*), powdery mildew (*Uncinula necator*), rust (*Phakopsora ampelopsis*), kaki: anthracnose (*Gloeosporium kakj*), angular leaf spot and circular leaf spot (*Cercospora kakj*, *Mycosphaerella nawae*), melons: downy mildew (*Pseudoperenospora cubensis*), anthracnose (*Colletotrichum lagenarium*), powdery mildew (*Sphaerotheca fuliginea*), gummy stem blight (*Mycosphaerella melonis*), tomato: late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), leaf mold (*Cladosporium fulvum*), egg plant: brown spot (*Phomopsis vexans*), powdery mildew (*Erysiphe cichoracearum*), rape: black rot (*Alternaria japonica*), white rot (*Cercospora brassicae*), onion: rust (*Puccinia allii*), soybean: purple stain of seed (*Cercospora kikuchii*), sphaceloma scab (*Elsinoe glycines*), black spot (*Diaporthe phaseololum*), kidney bean: anthracnose (*Colletotrichum lindemuthianum*), peanut: leaf spot (*Mycosphaerella personatum*), brown leaf spot (*Cercospora arachidicola*), pea: powdery mildew (*Erysiphe pisi*), potato: late blight (*Alternaria solani*), strawberry: powdery mildew

(*Sphaerotheca humuli*), tea plant: net blister blast (*Exobasidium reticulatum*), white scab (*Elsinoe leucospila*), tobacco: brown spot (*Alternaria lingipes*), powdery mildew (*Erysiphe cichoracearum*), anthracnose (*Colletotrichum tabacum*), beet: cercospora leaf (*Cercospora beticola*), rose: black spot (*Diplocarpon rosae*), powdery mildew (*Sphaerotheca pannosa*), chrysanthemum: leaf spot (*Septoria chrysanthemi-indici*), rust (*Puccinia horiana*), various crops: gray mold (*Botrytis cinerea*), various crops: sclerotinia rot (*Sclerotinia sclerotiorum*), and the like.

Upon use of the compound of the invention as agricultural and horticultural fungicides, they are generally mixed with a suitable carrier, for example, solid carriers such as clay, talc, bentonite and diatomaceous earth, or liquid carriers such as water, alcohols (methanol, ethanol, etc.), aromatic hydrocarbons (benzene, toluene, methylnaphthalene, etc.), chlorinated hydrocarbons, ethers, ketones, esters (ethyl acetate, etc.), acid amides (dimethylformamide, etc.), or the like to be applied. If desired, emulsifying agents, dispersants, suspension agents, penetrating agents, spreading agents, stabilizers and the like may be added so that the compounds can be subjected to practical application in any of formulation forms such as liquid formulation, emulsifiable concentrate, wettable powder, dust formulation, granule, or flowable powder.

The compound of the invention can be mixed or used in combination with various active compounds such as fungicides, bactericides, acaricides, nematicides and insecticides or other biologically active compounds. Common names of these active compounds will be listed below concretely. However, the invention should not be construed as being limited thereto.

Fungicidally active compounds: acibenzolar, ampropyfos, anilazine, azaconazole, azoxystrobin, benalaxyl, benodail, benomyl, benzamacril, binapacryl, biphenyl, bitertanol, bethoxazine, bordeaux mixture, blasticidin-S, bromoconazole, bupirimate, buthiobate, calcium polysulfide, captafol, captan,

copper oxychloride, carpropamid, carbendazim, carboxin, chinom thionat, chlobenthiazone, chlorfenazol, chloroneb, chlorothalonil, chlozolinate, cufraneb, cymoxanil, cyproconazol, cyprodinil, cyprofuram, debacarb, dichlorophen, dichlobutrazol, dichlofluanid, dichlormedine, dichloran, diethofencarb, dichlocymet, difenoconazole, diflumetorim, dimethirimol, dimethomorph, diniconazole, diniconazole-M, dinocap, diphenylamine, dipyrithione, ditalimfos, dithianon, dodemorph, dodine, drazoxolon, edifenphos, epoxiconazole, etaconazole, ethirimol, etridiazole, famoxadone, fenarimol, febuconazole, fenfuram, fenpiclonil, fenpropidin, fenpropimorph, fentin, ferbam, ferimzone, fluazinam, fludioxonil, fluoroimide, fluquinconazole, flusilazole, flusulfamide, flutolanil, flutriafol, folpet, fosetyl-aluminium, fuberidazole, furalaxyd, fenamidone, fenhexamid, guazatine, hexachlorobenzene, hexaconazole, hymexazol, imazalil, imibenconazole, iminoctadine, ipconazole, iprobenfos, iprodione, isoprothiolane, iprovalicarb, kasugamycin, kresoxim-methyl, mancopper, mancozeb, maneb, mepanipyrim, mepronil, metalaxyl, metconazole, metiram, metominostrobin, myclobutanil, nabam, nickel bis(dimethyldithiocarbamate), nitrothal-isopropyl, nuarimol, octhilinone, ofurace, oxadixyl, oxycarboxin, oxpoconazole fumarate, pefurzoate, penconazole, pencycuron, phthalide, piperalin, polyoxins, probenazole, prochloraz, procymidone, propamocarb hydrochloride, propiconazole, propineb, pyrazophos, pyrifenox, pyrimethanil, pyroquilon, quinoxyfen, quintozene, sulfur, spiroxamine, tebuconazole, tecnazene, tetraconazole, thiabendazole, thifluzamide, thiophanate-methyl, thiram, tolclofos-methyl, tolylfuanid, triadimefon, toriadimenol, triazoxide, tricyclazole, tridemorph, triflumizole, triforine, triticonazole, validamycin, vinclozolin, zineb, ziram.

Bactericidally active compounds: streptomycin, oxytetracycline, oxolinic acid.

Nematicidally active compounds: aldoxycarb, fosthiazate, fosthietan, oxamyl, fenamiphos.

Acaricidally active compounds: amitraz, bromopropylate, chinomethionat, chlorobenzilate, clofentezine, cyhexatine, dicofol, dienochlor, ethoxazole, fenazaquin, fenbutatin oxide, fenpropathrin, fenproximate, halfenprox, hexythiazox, milbemectin, propargite, pyridaben, pyrimidifen, tebufenpyrad.

Insecticidally active compounds: abamectin, acephate, acetamiprid, azinphos-methyl, bendiocarb, benfuracarb, bensultap, bifenthrin, buprofezin, butocarboxim, carbaryl, carbofuran, carbosulfan, cartap, chlorfenapyr, chlorpyrifos, chlorfenvinphos, chlorfluazuron, clothianidin, chlromafenozide, chlorpyrifos-methyl, cyfluthrin, beta-cyfluthrin, cypermethrin, cyromazine, cyhalothrin, lambda-cyhalothrin, deltamethrin, diafenthiuron, diazinon, diacloden, diflubenzuron, dimethylvinphos, diofenolan, disulfoton, dimethoate, EPN, esfenvalerate, ethiofencarb, ethiprole, etofenprox, etrimfos, fenitrothion, fenobucarb, fenoxy carb, fenpropathrin, fenvalerate, fipronil, flucythrinate, flufenoxuron, flufenprox, tau-fluvalinate, fonophos, formetanate, formothion, furathiocarb, halofenozide, hexaflumuron, hydramethylnon, imidacloprid, isofenphos, indoxacarb, isoprocarb, isoxathion, lufenuron, malathion, metaldehyde, metahamidophos, methidathion, methacrifos, metalcarb, methomyl, methoprene, methoxychlor, methoxyfenozide, monocrotophos, muscalure, nitenpyram, omethoate, oxydemeton-methyl, oxamyl, parathion, parathion-methyl, permethrin, phentoate, phoxim, phorate, phosalone, phosmet, phosphamidon, pirimicarb, pirimiphos-methyl, profenofos, pymetrozine, pyraclofos, pyriproxyfen, rotenone, sulprofos, silafluofen, spinosad, sulfotep, tebfenozide, teflubenzuron, tefluthorin, terbufos, tetrachlorovinphos, thiodicarb, thiamethoxam, thiophanox, thiometon, tolfenpyrad, tralomethrin, trichlorfon, triazuron, triflumuron, vamidothion.

When used as agricultural and horticultural fungicides, the compounds of the invention can be applied by foliage application, soil treatment, seed disinfection and the like. They are also effective in general methods usually utilized by those skilled

in the art.

Further, if necessary, other herbicides, and various insecticides, fungicides, plant growth regulators, synergists and the like may be mixed at formulation or spraying and used together. An application rate of the compound of the invention varies due to an application field, an application period, an application method, a target disease, a cultured crop and the like, but generally it is suitable to apply about 0.005 - 50 kg of the active ingredient per hectare.

Next, formulation examples of fungicides containing the compound of the invention as active ingredients are shown as follows. However, the present invention should not be construed as being limited thereto. In the following formulation examples, all "parts" means are "parts by weight".

Formulation Example 1 Emulsifiable Concentrate

Compound of the invention	20 parts
Methylnaphthalene	55 parts
Cyclohexanone	20 parts
Sorpol 2680 (mixture of nonionic surfactant and anionic surfactant: Toho Kagaku Kogyo K.K., trade name)	
	5 parts

The above components are mixed uniformly to make an emulsion. Upon use, the emulsion is diluted by 50 - 20,000 times to apply 0.005 - 50 kg of the active ingredient per hectare.

Formulation Example 2 Wettable Powder

Compound of the invention	25 parts
Zeeklite PEP (mixture of kaolinite and celisite: Zeeklite Industry K.K., Ltd.)	66 parts
Sorpol 5039 (anionic surfactant: Toho Kagaku Kogyo K.K., trade name)	4 parts
Carplex #80 (white carbon: Shionogi Seiyaku K.K., trade name)	3 parts
Calcium ligninsulfonate	2 parts

The above components are mixed and ground uniformly to make a wettable powder. Upon use, the wettable powder is diluted

to 50 to 20,000 times to spray 0.005 to 50 kg of active ingredient per hectare.

Formulation Example 3 Dust Formulation

Compound of the invention	3 parts
Carplex #80 (white carbon: Shionogi Seiyaku K.K., trade name)	0.5 part
Clay	95 parts
Diisopropyl phosphate	1.5 parts

The above components are mixed and grounded uniformly to make a dust formulation. Upon use, the dust formulation is applied with 0.005 to 50 kg of active ingredient per hectare.

Formulation Example 4 Granule

Compound of the invention	5 parts
Bentonite	30 parts
Talc	64 parts
Calcium ligninsulfonate	1 part

The above components are mixed and grounded uniformly, stirred to mix with addition of a small amount of water, granulated by an extrusion granulator and dried to make a granule. Upon use, the granule is applied with 0.005 to 50 kg of active ingredient per hectare.

Formulation Example 5 Flowable Powder

Compound of the invention	25 parts
Solpol 3353 (nonionic surfactant: Toho Kagaku Kogyo K.K., trade name)	5 parts
Lunox 1000C (anionic surfactant: Toho Kagaku Kogyo K.K., trade name)	0.5 part
Xanthan gum (natural polymer)	0.2 part
Sodium benzoate	0.4 part
Propylene glycol	10 parts
Water	58.9 parts

The above components except for the active ingredient (the compound of the invention) are dissolved uniformly, to which the compound of the invention is added, stirred well, and thereafter water-grounded in a sand mill to obtain a flowable powder. Upon

use, the flowable powder is diluted by 50 - 20,000 times to apply 0.005 - 50 kg of the active ingredient per hectare.

BEST MODE FOR CARRYING OUT THE INVENTION

Next, the present invention will be explained concretely by examples. However, the present invention should not be construed as being limited thereto.

Example 1

Preparation of 1-(N,N-dimethylsulfamoyl)-3-(2-methyl-3-chloroindol-1-yl)sulfonyl-1,2,4-triazole (1-33(a))

0.6 g of 2-methyl-3-chloroindole was dissolved in 20 ml of tetrahydrofuran, and 0.17 g of sodium hydride (55% or more) was added thereto with stirring under ice-cooling. After stirring at room temperature for 1 hour, the solution was ice-cooled again and 1.0 g of 1-N,N-dimethylsulfamoyl-3-chlorosulfonyl-1,2,4-triazole was added, and then the mixture was stirred at room temperature for 3 hours. After completion of the reaction, diluted hydrochloric acid was added and the reaction mixture was extracted with ethyl acetate. After distilling off the solvent, the residue was purified by column chromatography to obtain 0.73 g of the titled compound.

Example 2

Preparation of 1-(N,N-dimethylsulfamoyl)-3-(3-chloroindazol-1-yl)sulfonyl-1,2,4-triazole (7-5(a))

0.5 g of 3-chloroindazole was dissolved in 20 ml of tetrahydrofuran, and 0.4 g of triethylamine was added thereto with stirring under ice-cooling. Thereafter, 0.94 g of 1-N,N-dimethylsulfamoyl-3-chlorosulfonyl-1,2,4-triazole was added, and then the mixture was stirred at room temperature for 16 hours. After completion of the reaction, the reaction mixture was neutralized with diluted hydrochloric acid, and extracted with ethyl acetate. After distilling off the solvent, the residue was purified by column chromatography to obtain 0.94 g of the titled compound.

Example 3

Preparation of 1-(N,N-dimethylsulfamoyl)-3-(3-phenyl-4-

chloro-5-methylpyrazol-1-yl)sulfonyl-1,2,4-triazole (8-11(a))

0.56 g of 3-phenyl-4-chloro-5-methylpyrazole was dissolved in 20 ml of tetrahydrofuran, and 0.47 g of triethylamine was added thereto with stirring under ice-cooling. Thereafter, 0.8 g of 1-N,N-dimethylsulfamoyl-3-chlorosulfonyl-1,2,4-triazole was added, and then the mixture was stirred at room temperature for 16 hours. After completion of the reaction, the reaction mixture was neutralized with diluted hydrochloric acid, and extracted with ethyl acetate. After distilling off the solvent, the residue was purified by column chromatography to obtain 1.04 g of the titled compound.

Example 4

Preparation of 1-dimethylsulfamoyl-3-(4-trifluoromethylbenzoyl)-1,2,4-triazole (11-19(a))

0.31 g of 3-(4-trifluoromethylbenzoyl)-1,2,4-triazole was dissolved in 3 ml of DMF, 0.21 g of potassium carbonate was added thereto, and then 0.22 g of dimethylsulfamoyl chloride was added at room temperature with stirring. After stirring the reaction mixture for 1.5 hours at room temperature, water was added to precipitate crystals, and the crystals were collected by filtration and washed with diethyl ether. Drying of the mixture under reducing pressure afforded 0.31 g of the titled compound.

Example 5

Preparation of 1-dimethylsulfamoyl-3-(2-methylimidazo[1.2-a]pyridin-3-ylsulfonyl)-1,2,4-triazole (10-2(a))

1.2 g of 1-dimethylsulfamoyl-3-(2-methylimidazo[1.2-a]pyridin-3-ylsulfonyl)-1,2,4-triazole was dissolved in a mixture of 20 ml of acetonitrile and 20 ml of water, and 3.0 g of sodium percarbonate was added thereto at room temperature. After stirring the mixture for 1 hour at room temperature, additional 3.0 g of sodium percarbonate was added. After completion of the reaction, the reaction mixture was neutralized with diluted hydrochloric acid and extracted with ethyl acetate. After distilling off the solvent, the residue was purified by

column chromatography to obtain 0.3 g of the titled compound.

Next, the physical properties of the compounds of the formula (1) prepared according to these methods are shown in Table 12.

Table 12

Compound No.	Property (m.p. °C)
1-1(a)	98-100
1-2(a)	74-76
1-3(a)	70-72
1-4(a)	70-72
1-9(a)	136-139
1-10(a)	118-121
1-11(a)	138-139
1-12(a)	138-139
1-13(a)	96-98
1-14(a)	Oil
1-20(a)	125-126
1-21(a)	120-122
1-22(a)	118-121
1-23(a)	78-79
1-26(a)	141-142.5
1-27(a)	60-61
1-31(a)	158-161
1-32(a)	145.5-146.5
1-33(a)	120-122
1-34(a)	81-82
1-35(a)	71-72
1-38(a)	128-129
1-41(a)	151-154
1-42(a)	140-141
1-42(1)	Oil
1-42(k)	142-145
1-42(l)	167.5-171
1-43(a)	118.5-120
1-44(a)	149-150
1-45(a)	Oil
1-50(a)	124-126
1-51(a)	181-182
1-56(a)	94-95
1-57(a)	61-63
1-62(a)	147.5-149
1-63(a)	134.5-136
1-71(a)	159-159.5
1-72(a)	104-107

Table 12 (continue)

Compound No.	Property (m.p. °C)
1-81(a)	163-165
1-105(a)	135-137
1-118(a)	137-140
1-119(a)	139-140
1-125(a)	129-131
1-126(a)	119-121
1-130(a)	142-145
1-131(a)	128-129
1-133(a)	113-115
1-135(a)	80-81
1-136(c)	134.5-135.5
1-148(a)	112-113
1-152(a)	120-122
1-161(a)	Oil
1-163(a)	134.5-136
1-168(a)	138-139.5
1-187(a)	172-174
1-188(a)	166-168
1-211(a)	94-95
1-222(a)	126-127
1-232(a)	172-174
1-233(a)	164-165
1-243(a)	Oil
1-258(a)	125-128
1-265(a)	142-143.5
1-266(a)	114-117
1-276(a)	177.5-179
1-276(j)	87-89
1-277(a)	132-133
1-283(a)	112-113
1-289(a)	138.5-139.5
1-290(a)	142-143
1-298(a)	90-92
1-311(a)	142-143
1-316(a)	65-66.5
1-316(j)	91-92
1-326(a)	82-84
1-343(a)	Oil
1-353(a)	160-163
1-370(a)	Oil
1-378(a)	93-94
1-396(a)	149-151
1-403(a)	129-131
1-414(a)	151.5-153
1-421(a)	107-108.5
1-435(a)	184-186

Table 12 (continue)

Compound No.	Property (m.p. °C)
1-440(a)	194.5-195.5
1-445(a)	50-53
1-470(a)	120-122
1-497(a)	119-121
1-508(a)	148-150
1-518(a)	Oil
1-537(a)	153-155
1-548(a)	204-206 (decomposition)
1-557(a)	Oil
1-568(a)	51-53
2-2(a)	134-135
2-2(b)	160-161
2-2(n)	184-186
2-2(o)	180-181.5
2-3(b)	140.5-142
2-3(n)	151.5-152.5
2-3(o)	162.5-163
2-4(b)	176-180
2-5(a)	143-144
2-5(b)	174-176
2-6(a)	104-105
2-6(d)	141-143
2-6(e)	168-169
2-6(n)	173-175
2-7(a)	117-118
2-7(b)	142-145
2-7(n)	143-144
2-8(b)	177-179
2-8(x)	123-124
2-10(a)	112.5-114
2-10(b)	143-145
2-10(n)	163-164.5
2-10(v)	138-141
2-11(e)	149-150.5
2-14(a)	85.5-87
2-14(b)	150.5-153
2-17(a)	145-147
2-17(b)	181-183
2-18(a)	86-87
2-18(b)	134-136
2-19(a)	82-83
2-19(b)	136-138
2-20(a)	109-110
2-20(b)	148-149
2-24(a)	61-63
2-24(b)	81-83

Table 12(continu)

Compound No.	Prop rty (m.p. °C)
2-26(a)	126.5-127.5
2-30(a)	177-179
2-30(b)	174-176
2-34(a)	156-157
2-34(b)	181-183
2-39(e)	126-128
2-44(b)	162-163
3-1(a)	160-162
5-1(a)	115-118
5-22(a)	Oil
5-23(a)	39-42
5-34(a)	55-58(decomposition)
5-58(a)	44-47
5-82(a)	121-123
5-146(a)	182-184
5-146(h)	145.5-147.5
5-153(a)	139-140
5-165(a)	128-129.5
5-227(a)	42-45
5-234(a)	Oil
5-247(a)	Oil
5-254(a)	68-70
5-254(h)	Oil
5-261(a)	151-154
5-274(a)	173-176
5-490(a)	126-129
5-495(a)	149-150.5
5-506(a)	145-147
6-6(a)	163.5-164.5
6-30(a)	54-56
7-1(a),(b)	135-137(mixture)
7-2(e)	135-136
7-5(a)	164-165
8-1(a)	154.5-155.5
8-10(a)	110.5-111
8-11(a)	125-128
10-2(a)	179.5-181
11-1(a)	81-82
11-17(a)	89-91
11-18(a)	62-63
11-19(a)	121-122
11-24(a)	133-135

Usefulness of the compound of the invention will be explained concretely by the following test examples. However,

the present invention should not be construed as being limited thereto.

Test Example 1: Test on Cucumber Downy Mildew Controlling Effect

Cucumber (species: Sagami Hanjiro) grown in a pot having a diameter of 7 cm was applied at 1.5 leaf stage by means of a spray-gun with 20 ml per a pot of agent solution which was prepared by diluting the emulsifiable concentrate of the compound of the invention with water to 500 ppm.

A day after application, spore suspension of cucumber downy mildew pathogen (*Pseudoperonospora cubensis*) (2×10^5 /ml) was sprayed for inoculation. Inoculated cucumber was placed in an inoculation box at a temperature of 25°C and a humidity of 95 % or more for one day and night. Thereafter, the cucumber was placed in a greenhouse and determined a ratio of disease spot area formed after 7 days from inoculation to inoculated leaves to calculate a control value according to the following equation:

$$\text{control value} = [1 - (\text{disease spot area proportion in treated part} / \text{disease spot area proportion in non-treated part})] \times 100$$

As a result, the following compounds showed a controlling value of 100.

The compound of the invention No.: 1-1(a), 1-2(a), 1-3(a), 1-4(a), 1-9 (a), 1-10(a), 1-11(a), 1-12 (a), 1-13(a), 1-14(a), 1-20(a), 1-21(a), 1-22(a), 1-23(a), 1-32(a), 1-33(a), 1-34(a), 1-35(a), 1-38(a), 1-41(a), 1-42(a), 1-43(a), 1-44(a), 1-45(a), 1-50(a), 1-51(a), 1-56(a), 1-62(a), 1-63(a), 1-71(a), 1-72(a), 1-81(a), 1-105(a), 1-118(a), 1-119 (a), 1-125(a), 1-126(a), 1-130(a), 1-131(a), 1-133(a), 1-135(a), 1-136(c), 1-148(a), 1-152(a), 1-1

61(a), 1-163(a), 1-168(a), 1-187(a), 1-188(a), 1-211(a), 1-222(a), 1-232(a), 1-233(a), 1-243(a), 1-258(a), 1-265(a), 1-266(a), 1-276(a), 1-277(a), 1-283(a), 1-289(a), 1-290(a), 1-298(a), 1-311(a), 1-316(a), 1-326(a), 1-343(a), 1-353(a), 1-370(a), 1-378(a), 1-396(a), 1-403(a), 1-414(a), 1-421(a), 1-435(a), 1-440(a), 1-445(a), 1-470(a), 1-497(a), 1-508(a), 1-518(a), 1-537(a), 1-548(a), 1-568(a), 2-2(a), 2-2(b), 2-2(n), 2-2(o), 2-3(b), 2-3(n), 2-3(o), 2-4(b), 2-5(a), 2-5(b), 2-6(a), 2-6(d), 2-6(e), 2-6(n), 2-7(a), 2-7(b), 2-7(n), 2-8(b), 2-8(x), 2-10(a), 2-10(b), 2-10(n), 2-10(v), 2-11(e), 2-14(a), 2-14(b), 2-17(a), 2-17(b), 2-18(a), 2-18(b), 2-19(a), 2-19(b), 2-20(a), 2-20(b), 2-24(a), 2-24(b), 2-26(a), 2-34(a), 2-34(b), 2-39(e), 2-44(b), 3-1(a), 5-1(a), 5-22(a), 5-23(a), 5-34(a), 5-58(a), 5-82(a), 5-146(a), 5-153(a), 5-165(a), 5-227(a), 5-234(a), 5-247(a), 5-254(a), 5-261(a), 5-274(a), 5-490(a), 5-495(a), 5-506(a), 6-6(a), 6-30(a), 7-1(a), (b), 7-2(e), 7-5(a), 8-1(a), 8-10(a), 8-11(a), 10-2(a), 11-1(a), 11-17(a), 11-18(a), 11-19(a), 11-24(a).

INDUSTRIAL APPLICABILITY

These compounds are novel, exhibit excellent agricultural and horticultural fungicidal effect and have no phytotoxicity on useful crops so that they are useful as agricultural and horticultural fungicides.